

TEACHER'S GUIDE



to the Alaska Benchmark Examination Grade 8

State of Alaska
Department of Education
& Early Development

LETTER FROM THE COMMISSIONER



*D*ear Teacher:

This Teacher's Guide to the Alaska Performance Standards and the Alaska Benchmark Examination in Reading, Writing and Mathematics is designed to help you assist students to do their best on the Alaska Benchmark Examinations. There are three guides in this series—one for students in grade three, another for grade six and a third for grade eight.

This publication is the latest in a series of “bridge materials” that the Department of Education & Early Development has published to help increase student performance by “bridging” the learning gap between the Alaska Student Performance Standards in reading, writing and mathematics and the examinations that measure how well students are learning the standards.

This guide presents excellent ideas and activities on how to teach the concepts and skills specified in each of the Alaska performance standards. It also presents the best thinking of a group of teachers who are also content specialists. This group developed the ideas and activities over a period of time in 2001.

The publication can be placed in a three-holed binder. As time goes on, you can insert additional activities that prove effective for you and other teachers.

I thank the dozens of teachers and administrators who have contributed their time and expertise to this project. I also applaud all of you who are helping make our schools top quality places for students to learn.

Sincerely,

A handwritten signature in cursive script that reads "Shirley J. Holloway".

Shirley J. Holloway, Ph.D.
Commissioner of Education & Early Development

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INTRODUCTION

WHAT THIS TEACHER'S GUIDE CAN DO FOR YOU

Dear Teacher,

If you have questions about the Alaska Performance Standards and the Benchmark Examinations that will measure how well your students are reaching those standards, this guide should answer many of them.

Parts 1, 2, and 3 of the guide share ideas from master teachers that will help you prepare your students to meet the Alaska Performance Standards in Reading, Writing, and Mathematics. They include **Suggested Activities** for teaching each standard, examples of the **kinds of test questions** used to assess students on particular standards, and some **specific information about the tests** in each subject area. In addition:

- **Frequently Asked Questions**, immediately following this introduction, offer overall information about the Benchmark Exams.
- **Glossaries** in Part 4 clarify the uses of certain terms for Reading, Writing, and Mathematics.
- **Resources for Teachers** in Part 4 list publications and web sites you may find helpful in teaching Reading, Writing, and Mathematics.
- In Appendix 1 you will find charts showing the **Alaska Content and Performance Standards in Reading, Writing, and Mathematics** for students of all ages.
- In Appendix 2 you will find the complete **Practice Tests, Scoring Guides, and Test Item Maps** for the Grade 8 Benchmark tests.
- In Appendix 3 you will find **Proficiency Descriptors** that will help you gauge your students' competencies in specific subject areas.
- And in Appendix 4 an **Overview of Standards and the Comprehensive System of Student Assessment in Alaska** will give you a sense of how Alaska's standards and exams were developed and how they fit into students' progress from kindergarten through grade 12.

You, your students, parents, and other members of your community can also access nearly all this information on the Department of Education & Early Development web site (www.eed.state.ak.us).

We hope this guide will give you some new ideas for teaching the content and skills reflected in the statewide standards and help you prepare your students to succeed on the Grade 8 Benchmark Exam. Ideally, it will provide many opportunities for your students to demonstrate what they know and for you to discover what more they may need to know to meet and exceed the expectations expressed in the Alaska content and performance standards.

KEY TO NUMBERING OF THE ALASKA PERFORMANCE STANDARDS

FOR READING AND WRITING

This guide numbers the Alaska Performance Standards according to the system used in the tables of Alaska Performance Standards on the Department of Education & Early Development web site (www.eed.state.ak.us). Please note that the number systems for Reading and Writing differ from the system for Mathematics.

- The initial letter R or W indicates the subject area, Reading or Writing
- The first numeral indicates the age level
 - 1 = ages 5-7, assessed in grade 3
 - 2 = ages 8-10, assessed in grade 6
 - 3 = ages 11-14, assessed in grade 8

- The second numeral (sometimes followed by “a” or “b”) indicates the performance standard

Thus, a standard numbered R3.8 refers to Reading Performance Standard 8 for students ages 11-14.

FOR MATHEMATICS

- The initial letter A refers to the first Mathematics content standard.
- The first numeral indicates one of the six key elements under Mathematics Content Standard A. Those elements include:
 - 1—Numeration
 - 2—Measurement
 - 3—Estimation and Computation
 - 4—Functions and Relationships
 - 5—Geometry
 - 6—Statistics and Probability.
- The second numeral indicates the age level, using the numbers 1, 2, and 3 linked to the same age groups as in the Reading and Writing Performance Standards.
- The third numeral indicates the Mathematics Performance Standard under a particular key element.

Thus, a standard numbered A5.3.1 refers to Mathematics Performance Standard 1 under key element 5—Geometry, for students ages 11-14.

FREQUENTLY ASKED QUESTIONS

Q
A

What do the Alaska Benchmark Examinations measure?

The Alaska Benchmark Examinations measure whether students are achieving statewide academic standards in reading, writing, and math. The standards are benchmarked at three age levels: ages 5-7 (tested at grade 3); ages 8-11 (tested at grade 6); and ages 11-14 (tested at grade 8). Students will need to pass a fourth exam in reading, writing, and math before they can qualify for a high school diploma. The fourth exam is called the Alaska High School Graduation Qualifying Examination.

Q
A

Why do we have the Alaska Benchmark Examinations?

The Alaska Legislature authorized the exams, and the State Board of Education & Early Development sets the policy for their development. The Department of Education & Early Development contracted with CTB/McGraw-Hill, a commercial test publisher, to develop the examinations.

Q
A

How will Alaskans know whether the Alaska Benchmark Examinations are appropriate for students in our state?

The State Board of Education & Early Development appointed several committees of Alaskans to review the work of the test publisher. The committees made sure the examinations are fair for all students in Alaska and that they measure the levels of achievement that Alaskans expect of their young people at certain points in their schooling. The committees also looked at such issues as test bias and alignment with the Alaska Performance Standards in Reading, Writing, and Mathematics.

Q
A

Will there be any financial cost to parents or students for taking the Alaska Benchmark Examinations?

No.

Q
A

How long will students spend taking tests?

No time limit will be set for finishing a test. Students may take as long as they need to complete it. However, most students can expect to spend two or three hours to complete each of the three tests. School districts may administer one test per day over a three-day period, or they may choose to subdivide the tests and administer them in shorter sessions over a five-day period.

Q
A

What kinds of questions will be on the Alaska Benchmark Examinations?

There will be three types of questions on all the Benchmark Examinations: multiple-choice, short “constructed-response,” and extended “constructed-response.” Multiple-choice questions will offer three or four answer choices; students will select the best answer and mark the appropriate circle. For “constructed-response” questions, students will write their answers on lines or in spaces provided. Short “constructed-response” questions will require a few words, phrases, or sentences; that a problem be solved; or that a form or chart be completed. They may take two to five minutes to complete. Extended “constructed-response” questions may require students to write a paragraph, an essay, or a story; or to complete a multi-step task. They may require 15 minutes to an hour to complete. Constructed-response questions in mathematics will require students to show their work.

A large, stylized letter 'Q' in blue and a large, stylized letter 'A' in black, positioned to the left of the first question.**How will students, parents, and school districts learn the results of the Alaska Benchmark Examinations?**

The Department of Education & Early Development will coordinate the administration, scoring, and reporting of the Alaska Benchmark Examinations. Following the administration and scoring of the examinations, the department will report test results for individual students, schools, and school districts. The reports will provide information about student strengths and weaknesses in reading, writing, and mathematics and how they relate to specific performance standards that were developed for Alaska students.

A large, stylized letter 'Q' in blue and a large, stylized letter 'A' in black, positioned to the left of the second question.**What are passing scores on the Alaska Benchmark Examinations?**

There are no passing scores. Instead, students can demonstrate four different levels of performance on each subject area test: advanced, proficient, below proficient, and not proficient. Several committees involving some 250 Alaska educators, parents, Native leaders, business leaders, and others recommended the points (or “cut scores”) that would separate each proficiency level from the others. The scores were later adopted by the State Board of Education & Early Development.

A large, stylized letter 'Q' in blue and a large, stylized letter 'A' in black, positioned to the left of the third question.**What else do the four performance levels show?**

The committees that established what scores would distinguish between performance levels also developed “proficiency descriptors.” These describe what students at each proficiency level can do in terms of the content and skills that are assessed on the Benchmark Examinations. The descriptors can help teachers, parents, and students determine what students need to practice to progress academically and meet the performance standards for each subject area and grade level.



PART ONE

Reading

READING STANDARDS & ASSESSMENT

WHAT THE READING TEST WILL BE LIKE

The Reading Test of the Grade 8 Alaska Benchmark Examination will assess students' ability to:

- comprehend text and determine the meaning of new words;
- infer meaning from a text and identify themes;
- summarize information and ideas, and make connections with related information and experience;
- read and follow multi-step directions, and identify their sequence;
- analyze narrative elements and basic conventions of genres;
- differentiate fact from opinion;
- analyze an author's purpose, and evaluate the author's effectiveness.

TYPES OF QUESTIONS

The Reading Test will include:

- about 30 multiple-choice questions in which students will be asked to select the best answer from a list of three or four possible answers;
- about five short "constructed-response" questions in which students may be asked to write their answers in a few words, phrases, or sentences; to write a letter or draw a picture and tell about what they drew; or to complete a graph or chart; and
- one extended "constructed-response" question that will ask students to write a longer response to a prompt.

Questions in the Reading Test will be based on short passages of reading, which may include fiction, non-fiction, and other genres.

SCORING

Students' answers to multiple-choice questions in the Reading Test will be scored according to an answer key. Correct answers will receive one point; incorrect answers will receive no points.

Readers will score students' answers to "constructed-response" questions by comparing them to item-specific scoring guides, which show exemplary responses and provide guidelines for the number of points to be awarded. *(See sample scoring guides at the end of the Reading Practice Test in Appendix 2 of this guide.)*

REPORTING STUDENTS' SCORES

Each student's scores for the Reading Test will provide three kinds of information:

- an overall score
- one of four proficiency ratings:
 - advanced
 - proficient
 - below proficient
 - not proficient
- information about how well the student scored on each of the reading standards assessed by the test.

(For more information about proficiency levels and how student scores relate to performance standards, see the Proficiency Descriptors in Appendix 3 at the back of this guide.)

TIME AND MATERIALS REQUIRED

Students may take as long as they need to complete the Reading Test, but most students should be able to finish in two to three hours. All necessary materials will be provided. Students are not allowed to use dictionaries, thesauruses, or other reference materials during the test, except in some cases, as in accommodations for students with disabilities. *(See Participation Guidelines for the Inclusion of Special Education and LEP Students in State Assessments under “Student Testing” on the Department of Education & Early Development web site, www.eed.state.ak.us)*

PREPARING STUDENTS to Meet Specific Standards in Reading

This section describes activities that teachers can use to help their students meet each of the Reading Performance Standards for students ages 11-14 (tested on the Grade 8 Benchmark Examination). Suggested activities are keyed to specific performance standards, which are spelled out in the lefthand column adjacent to them.

This section also includes sample test items from the Reading Practice Test for Grade 8, and some explanations of how specific test items relate to specific performance standards.

(The Alaska Reading Performance Standards for students at all age levels can be found in Appendix 1 at the back of this guide; on the Department of Education & Early Development web site (www.eed.state.ak.us) under “Standards for Student Learning”; and in the booklet Standards for Alaska Students, Alaska Department of Education & Early Development, February 1999.)

(The complete Reading Practice Test and Scoring Guides for the Grade 8 Benchmark Exam can be found in Appendix 2.)

PURPOSE

Reading is a primary means of acquiring information and developing skills in a wide variety of areas. It also provides enjoyment and enrichment through the experience of good literature. Students who understand this:

- read independently for academic reasons and personal enjoyment;
- connect new information or ideas and themes to personal experiences and the experiences of others;
- differentiate between fact and opinion in text and understand authors’ purposes;
- understand the role of narrative elements including plot, character, setting, and point of view; and
- recognize historical and cultural influences in text.

SUGGESTED ACTIVITIES

PERFORMANCE STANDARD: R3.1

Students can apply knowledge of word origins, structure and context clues, and root words, and they can use dictionaries and glossaries, to determine the meaning of new words and to comprehend text.

Using context clues

- In their notebooks for keeping track of new and unfamiliar words and phrases, have students write the origin of each word, its root, and context clues they found in the sentence(s) where it was used. This will be an ongoing project.

SAMPLE PRACTICE QUESTION

After reading the passage on “Iceberg Right Ahead!” students are asked a number of questions including:

12. When the author says that an iceberg can do “Titanic” damage, she probably means the damage is

- Ⓐ gigantic
- Ⓑ different
- Ⓒ noticeable
- Ⓓ understandable

Comments: Practice Test item 12 relates to standard R3.1 because students must use contextual information about the size of the *Titanic* to determine that “Titanic damage” means gigantic damage. Item 14 also requires students to use contextual clues to determine the definition of the term “iceberg.”

PERFORMANCE STANDARD: R3.2

PERFORMANCE STANDARD: R3.3

Students can rehearse and read texts aloud to an audience, in performances such as readers' theater, reading to younger students or peers, or as part of formal presentations including research reports and literature responses.

PERFORMANCE STANDARD: R3.4

Students can restate and summarize information or ideas from a text and connect new information or ideas to prior knowledge and experience.

Alaska Performance Standards for ages 11-14 do not address basic literal and inferential comprehension. Performance standards R3.4 and R3.5 address comprehension at this level.

Reading texts aloud

- Have students create a speech for a character based on their research of a historical figure or a character from a novel or short story. Have them deliver the speech to the class.
- Have students write and read the daily news on the school television circuit or over an intercom "radio station."
- Hold student poetry readings on a regular basis.
- Have students read to younger children in a weekly "reading buddy" program.
- Have students interview their young reading buddies and create biographies of them. Have them read the biographies to the younger children and give them "published" copies to take home.

Restating, summarizing, and making connections

- Have students keep notebooks about their reading on pages divided into quarters. In the first quarter have them write facts about the topic of the reading in brief sentences. In the second have them write their questions about the topic. In the third have them write what the information in the reading means to them. In the fourth ask them to illustrate their perception of the information with drawings, diagrams, or symbols.
- "I Think, I Know, I Wonder" charts can be used as pre- and post-reading activities for non-fiction materials. Have students list what they think about a given topic, what they already know, and what they hope to find out through reading about the topic. As they read, have them change and add to the chart, answering the "I Wonder" questions, confirming or changing what they think about the topic, and correcting any misperceptions they may have had.
- "I Think, I Know, I Wonder" can also be used with novels to help students interact with the text. In this case, have students fill out a new chart before reading each chapter. Base the first chart on the title, author information, cover illustration, date and place of publication, and any other information outside the text of the chapters.

SAMPLE PRACTICE QUESTION

After reading the passage on "Best Friends," students are asked a number of questions including:

6. At the end of the story, Jennifer says she had stopped being a friend. Write a paragraph explaining how Jennifer had stopped being a friend and why. Use details from the passage to support your answer.

 _____ [More lines provided] _____

Comments: Practice Test item 6 relates to standard R3.4 because it asks students to write a paragraph explaining something that happened in the passage. It also relates to standard R3.5 in that it asks students to provide details from the passage to support their answers. Practice Test items 7, 9, 11, and 16 also relate to this standard in that they ask students to select statements that restate information from the passage.

PERFORMANCE STANDARD: R3.5

Students can clarify and connect main ideas and concepts, identify their relationship to other sources and related topics, and provide supporting details.

Clarifying and connecting main ideas

- Research projects are a good way to help students develop these skills. For example, in studying the Civil War, have students compare the views of the North and the South on the issues of the Fugitive Slave Act and slavery in the new territories. Have them find and list evidence to support whether the majority of people in each region supported or opposed each of these measures. Have them read materials by and about historical figures such as Harriet Beecher Stowe, Sojourner Truth, William Lloyd Garrison, Frederick Douglass, John Brown, Harriet Tubman, and Nat Turner, then describe the contributions of abolitionists to the rising conflict between North and South.

SAMPLE PRACTICE QUESTION

After reading the passage on “Weather or Not,” students are asked a number of questions including:

8. This passage is mostly about

- (A) how animals predict the weather
- (B) the history of weather prediction
- (C) how to invent aphorisms to predict the weather
- (D) the value of aphorisms in predicting the weather

Comments: Practice Test items 1 and 8 relate to standard R3.5 because they ask students to identify what each associated passage is “mostly about;” students must clarify the main ideas. Item 3 asks students to select a good title for the associated passage. (Titles generally reflect the main idea.) Item 6 is a constructed-response question that asks students to clarify and connect main ideas. The scoring guide at the back of the Reading Practice Test shows the rubric that guides scoring for this question. Students may benefit from familiarity with the expectations outlined in all the scoring rubrics for constructed-response questions on the practice test.

PERFORMANCE STANDARD: R3.6

Students can read and follow multi-step directions to complete a task, and identify the sequence prescribed.

Understanding the sequence of multi-step directions

- Have students put on a cooking show in which they must follow multi-step directions (and in a particular sequence) to get the desired product. Use some cooking shows from television as models.
- Provide CPR and/or basic first aid training for students.

SAMPLE PRACTICE QUESTION

After reading the passage on “Iceberg Right Ahead!” students are asked a number of questions including:

18. Think about the articles “Iceberg Right Ahead!” and “Weather or Not.” Complete the chart by identifying two differences and two similarities between the articles.

“Iceberg Right Ahead!”	“Weather or Not”
Similarities	Differences

PERFORMANCE STANDARD: R3.7

Students can analyze basic rules (conventions) of the four genres of fiction (short story, drama, novel, and poetry).

Comments: Practice Test item 18 relates to standard R3.6 because it requires students to follow specific directions in order to get full credit for their response.

Understanding the conventions of common genres

- Teach the basic mechanics of poetry, figurative language, and nuances in literature. Discuss rules and how authors often break them for a reason (as, for example, in using sentence fragments). Have students map the characteristics of each genre.

SAMPLE PRACTICE QUESTION

After reading the passage on “Weather or Not,” students are asked a number of questions including:

10. This passage is an example of

- Ⓐ a drama
- Ⓑ fiction
- Ⓒ nonfiction
- Ⓓ a short story

Comments: Practice Test item 10 relates to standard R3.7 in that it asks students to determine whether the passage is drama, fiction, nonfiction, or a short story. Students must know the conventions of the four genres in order to make the correct selection, but the item does not ask them to analyze those conventions.

PERFORMANCE STANDARD: R3.8

Students can analyze and evaluate narrative elements including plot, character, setting, and point of view to determine their importance to the story.

Analyzing and evaluating narrative elements

- After reading a text, ask students questions such as: How important is the setting to the story? Could the story have taken place somewhere else? How would this story be different if it were set in another place or time? How would this story be different if you were the main character?

SAMPLE PRACTICE QUESTION

After reading the passage on “Best Friends,” students are asked a number of questions including:

2. When Jennifer says, “so when things started changing, I wasn’t ready,” she means

- Ⓐ the girls had different interests now
- Ⓑ the girls no longer had the same earrings
- Ⓒ Jennifer was no longer interested in writing
- Ⓓ Jennifer was no longer interested in being an artist

Comments: Practice Test item 2 is related to standard R3.8 because students must develop some insight into Jennifer’s character to be able to answer the question. Item 6 also relates to this standard because it requires students to analyze and explain one element of the plot.

**PERFORMANCE
STANDARD: R3.9a**

Students can differentiate between fact and opinion in text.

Differentiating between fact and opinion

- Have students support their portion of a forum with facts.
- Have students participate regularly in Socratic seminars.
- Have students collect news articles, related editorials, and letters to the editor on an interesting or controversial topic. Have them list facts from a news article, then analyze the editorials and letters for facts and opinions expressed there. Have them trade materials with a study partner and repeat the activity. The partners can then compare and discuss their findings.

SAMPLE PRACTICE QUESTION

After reading the passage on “Best Friends,” students are asked a number of questions including:

5. Which of the following sentences is an opinion?

- Ⓐ At the jewelry store, the lady showed us trays and trays of earrings.
- Ⓑ Today, I stopped at her house on the way to school, like I always do.
- Ⓒ When she liked the drawing, I gave it to her, and her mom framed it and hung the picture on the wall in Carmen’s room.
- Ⓓ Sometimes, I look at a drawing I’ve done and I think it’s horrible, and if anyone says anything nice, I think they’re just trying to be nice because they know I feel bad.

Comments: Practice Test item 5 relates to standard R3.9 because it asks students to identify which of four sentences represents an opinion. While the fourth sentence, the correct answer, is a factual statement, it does reflect the character’s opinion.

**PERFORMANCE
STANDARD: R3.9b**

Students can analyze an author’s purpose and offer a critical opinion of the effectiveness of the text in meeting that purpose.

Analyzing the author’s purpose

- Students should be exposed to and familiar with different genres. They should ask themselves:
 1. Is the author trying to entertain, inform, teach a moral, or persuade, etc.?
 2. What techniques did the author use in an effort to accomplish this purpose?
 3. Were any of these techniques particularly effective or ineffective?
 4. What could the author have done differently, if anything, to make the text more effective?
- Use book discussions, book reviews, and teacher modeling to show approaches to analyzing an author’s purpose and how well it is achieved in a text.

**PERFORMANCE
STANDARD: R3.10**

Students can connect themes to personal experiences, experiences of others, and other texts, and they can locate evidence from texts to support or illustrate these connections.

Making connections and showing evidence to support them

- Have students search digitized archives for primary sources that tell stories of people in one Southern and one Northern community before, during, and after the Civil War. You will find letters, diaries, newspapers, census records, maps, photographs, church records, and military records that have been scanned or transcribed onto the World Wide Web. Discovering and analyzing primary sources allows students to interact with and interpret data, engaging in authentic research. Projects and lessons are at (<http://curry.edschool.virginia.edu/teacherlink/social/resources>)

**PERFORMANCE
STANDARD: R3.11**

Students can compare and contrast how texts reflect historical and cultural influences.

Comparing and contrasting how texts reflect historical and cultural influences

- Through guided practice or teacher directed activity, you can lead students to search on their own for cues to historical and cultural influences in reading. For example, by reading literature about how the Great Depression of the 1930's affected a family in the South, you can discuss historical perspectives in regard to discrimination, economy, effects of government policies, etc. Bring this to students' attention through questioning techniques and the use of charts, diagrams, and graphs to compare how various texts represent historical and cultural perspectives.



PART TWO

Writing

PART TWO
WRITING

WRITING STANDARDS & ASSESSMENT

WHAT THE WRITING TEST WILL BE LIKE

The Writing Test of the Grade 8 Alaska Benchmark Examination will assess:

- students' ability to write coherent compositions, achieving different purposes for different audiences;
- their knowledge of writing conventions such as spelling, punctuation, grammar, and sentence structure; and
- their ability to edit and revise writing to make it more effective.

TYPES OF QUESTIONS

The Writing Test will include:

- about 30 multiple-choice questions in which students will be asked to select the best answer from a list of three or four possible answers;
- about five short “constructed-response” questions that will ask students to write a sentence, phrase, or paragraph, or to edit a writing sample;
- one extended “constructed-response” question that will ask students to produce a longer response to a prompt.

The Writing Test will include a “Writing Skills Checklist” reminding students to check their written responses for such things as writing on a single topic; using supporting details and complete sentences; and using correct spelling, grammar, and punctuation.

SCORING

Students' answers to multiple-choice questions in the Writing Test will be scored according to an answer key. Correct answers will receive one point; incorrect answers will receive no points.

Students' answers to short and extended “constructed-response” questions will be scored by raters who read each written answer and use 4-point and 6-point rubrics to determine how many points to award each answer. *(You can see the rubrics in the scoring guide at the end of the Writing Practice Test in Appendix 2 of this guide.)*

REPORTING STUDENTS' SCORES

Each student's scores for the Writing Test will provide three kinds of information:

- an overall score
- one of four proficiency ratings:
 - advanced
 - proficient
 - below proficient
 - not proficient
- and information about how well the student scored on each of the writing standards assessed by the test.

(For more information about proficiency levels and how student scores relate to performance standards, see the Proficiency Descriptors in Appendix 3 at the back of this guide.)

TIME AND MATERIALS REQUIRED

Students may take as long as they need to complete the Writing Test, but most students should be able to finish in two to three hours. All necessary materials will be provided. Students are not allowed to use dictionaries, thesauruses, or other reference materials during the test, except in some cases, as in accommodations for students with disabilities. *(See Participation Guidelines for the*

Inclusion of Special Education and LEP Students in State Assessments *under* “Student Testing” *on the Department of Education & Early Development web site* (www.eed.state.ak.us)

PREPARING STUDENTS to Meet Specific Standards in Writing

This section describes activities that teachers can use to help their students meet each of the Writing Performance Standards for students ages 11-14 (tested on the Grade 8 Benchmark Examination). Suggested activities are keyed to specific performance standards, which are spelled out in the lefthand column adjacent to them.

This section also includes sample test items from the Writing Practice Test for Grade 8, and some explanations of how specific test items relate to specific performance standards.

(The Alaska Writing Performance Standards for students at all age levels can be found in Appendix 1 at the back of this guide; on the Department of Education & Early Development web site (www.eed.state.ak.us) under “Standards for Student Learning”; and in the booklet Standards for Alaska Students, Alaska Department of Education & Early Development, February 1999.)

(The complete Writing Practice Test and Scoring Guides for the Grade 8 Benchmark Exam can be found in Appendix 2.)

PURPOSE

Writing is an important tool for informing, describing, entertaining, and persuading others. It is also a means of clarifying one’s own thinking and perceptions of the world. Students who understand this and have developed the appropriate skills can:

- write coherent paragraphs or compositions;
- use the conventions of standard English including grammar, sentence construction, paragraph organization, punctuation, capitalization, spelling and usage;
- revise their writing for clarity, logic, and effectiveness, and proofread it for correctness; and
- judge the quality of their own and others’ writing.

SUGGESTED ACTIVITIES

PERFORMANCE STANDARD: W3.1

Students can write a coherent composition that includes a thesis statement, supporting evidence, and a conclusion.

Writing a coherent composition

- Have students write arguments for a debate or forum.
- Have students discuss issues and write two or more pieces expressing different perspectives on a topic.
- Have students create an ad campaign to promote their community, school, team, etc. Before they write their ads, have them develop a thesis statement (a topic with limited focus), analyze the target audience, and gather whatever information they will need. Have groups present their ads to the class.
- Have students write a three-paragraph composition in response to an article using a “What? So What? Now What?” format (that is: What is the information in the text? What does it mean? and How can I use this information?)

SAMPLE PRACTICE QUESTION

15. Tell about one person who has made a difference in your life. Explain how and why this person has made a difference to you. You do not have to use all the lines.

- ☒ For this answer, make sure you use complete sentences and check your work for correct spelling, capitalization, and punctuation.

 _____ *[More lines provided]* _____

Comments: Practice Test item 15 relates to standard W3.1 because it asks students to write a composition about someone who has made a difference in their lives. The explanation they are asked to write requires that they use supporting evidence. The body of the letter students are asked to write in item 7 also requires students to use their knowledge of composition.

PERFORMANCE STANDARD: W3.2

Students can select and use appropriate forms of fiction and non-fiction to achieve different purposes when writing for different audiences.

Using appropriate forms for different audiences

- Discuss your plan with students so they know the purpose of this activity: “We want to create a reference document to share with the next generation so they will know what life was like 50 years ago in this area.”
 - Have students identify community members who could be interviewed, then have them conduct the interviews following guidelines for interview skills and note taking.
 - Back in the classroom, have students revise and polish their writing.
 - Have them type their work into a web page, desktop publishing program, or word processing program.
 - Publish final copy for distribution.
- Have students replicate the journal of a Civil War soldier, a character from a novel, or a historical figure. The piece must have a scaffolding of factual information from the times, and it should be augmented by student reaction to the individual’s situation. (Downloading actual diaries or getting published journals from the library for a model is recommended.)
- Have students select objects in the classroom to be “found” and studied by an archaeological team. Tag the “artifacts” with numbers. Have the students pick a number from a container, then write an essay (or journal, or story) about their artifact. They should describe it in detail, draw a diagram of it, and use their imaginations as to its function. (David Macaulay’s *Motel of Mysteries* provides a great example.)
- Help students find pen pals in areas of the world they are studying in social studies. Have them correspond regularly, using the letters as both social studies and English assignments.
- Have students research specific topics and create books for younger children. Topics from science and social studies make good subjects. Check with lower grades to find close matches in the topics being studied, then have students write for those grade levels. This can be a shared project for science or social studies and English classes.

SAMPLE PRACTICE QUESTION

7. Write a letter to your new pen pal in another country. Introduce yourself and explain what your life is like in Alaska. Your pen pal can be in any country you choose. You do not have to use all the lines.

- ☒ For this answer, make sure you use complete sentences and check your work for correct spelling, capitalization, and punctuation.

- ★ Use the **Writing Skills Checklist** below
- to help you plan your writing
 - to check your writing when you are done

Writing Skills Checklist

- 1 Have you written a letter that has a single topic, is supported with details, has well-developed paragraphs, and has a conclusion?
- 2 Have you written a letter that will make sense to the people who read it?
- 3 Have you chosen your words carefully?
- 4 Have you written complete sentences?
- 5 Have you used correct grammar?
- 6 Have you used correct capitalization and punctuation?
- 7 Have you spelled all the words correctly?
- 8 Have you written your letter clearly so that anyone can read your writing?

Date: _____

Dear: _____,

 _____ *[More lines provided]* _____

Your friend, _____

Comments: Practice Test item 7 relates to standard W3.2 because it asks students to write using a specific form (the letter) to a specific audience (a pen pal in another country). Item 15 also relates to this standard because it asks students to write using a different form for a different audience.

PERFORMANCE STANDARD: W3.3

Students can use the conventions of standard English including grammar, sentence structure, punctuation, spelling, and usage in written work.

Using conventions of standard English

- Post a chart of the standard proofreading symbols and teach students how to use it. (A chart of standard proofreading symbols and terminology can be found at (<http://webster.commnet.edu/writing/symbols.htm>).
- Provide students with copies of the Writing Checklist in the Writing Practice Test, and the scoring guides located at the back of the test. As a class activity, have students create a scoring guide for class writing projects.

- Provide mini-lessons and opportunities for practice in areas identified as problematic. A good source of materials can be found at (<http://ccc.commnet.edu/grammar/index2.stm>).
- Provide time and a structure for peer editing.
- Have students learn and teach the tools on word-processing software.

SAMPLE PRACTICE QUESTION

6. A student wrote a paragraph about an interview she did for her social studies class. There are six mistakes in spelling, grammar, and punctuation. Draw a line through each mistake and write the correction just above it.

The woman I interviewed for my report remind me of my grandmother in alaska. Their was similarities in age and other physical characteristics. She even talked like my grandmother. She is also very kind and offered me chocolate chip cookies, milk and ice cream. Like my grandmother, she also seemed to enjoy eating.

Comments: Practice Test item 6 relates to standard W3.3 because it asks students to proofread and make corrections to spelling, grammar, and punctuation in a paragraph written by someone else. Items 7 and 15 also relate to this standard because they require students to use the conventions of standard English in their written work.

PERFORMANCE STANDARD: W3.4a

Students can revise writing to improve organization, word choice, paragraph development, and voice appropriate to the purpose.

Revise writing to improve organization and other qualities

- Have students read a piece of their writing out loud to someone, or have a partner read a piece to its author. They may hear imperfections in the reading and make corrections.
- Create writing groups to give students feedback on their writing once it is fairly polished.
- Be sure students are familiar with the writing process and that they revise their work through various drafts.
- Publish a classroom magazine or newspaper and have students write different sections of it, such as sports; national, international, and local news; commercial and classified advertising; cartoons; etc.

SAMPLE PRACTICE QUESTION

1. Choose the best way to write Sentence 1.

- A The monarch butterfly is the best knowing of all the butterflies that migrate.
- B The monarch butterfly is the better known of all the butterflies that migrate.
- C The monarch butterfly is the best known of all the butterflies that migrate.
- D Best as it is: The monarch butterfly is the bestest known of all the butterflies that migrate.

**PERFORMANCE
STANDARD: W3.4b**

Students can form and explain their own standards or judgments of quality writing.

**PERFORMANCE
STANDARD: W3.5**

Students can list and document sources using a given format.

**PERFORMANCE
STANDARD: W3.6**

Students can compose and edit a composition with a word processing program.

Comments: Practice Test item 1 relates to standard W3.4a because it asks students to select the best way to write a sentence and provides them with four sentence choices, each having different word orders and grammatical constructions. A number of similar test items, including items 2 - 5 and 8 - 14, also relate to this standard. They require students to select the best sentence construction, sentence location in a paragraph, or way to combine sentences—all decisions that are part of the revision process.

Forming and explaining standards for quality writing

- Create writing groups of three or four participants in which students are both authors and responders. Here is one way to conduct these groups:
 1. Author reads one piece or part of a piece of writing.
 2. Three responders note a word or feeling that impressed them.
 3. Author reads the piece again.
 4. This time responders take longer notes about words or impressions they respond to.
 5. Responders each then tell the author what they liked or found powerful about the writing and/or what they didn't understand or that seemed out of place.
 6. The author thanks the responders for their feedback.
 7. The next author then reads his or her piece.
 8. Important features in this format are teaching students to use phrases such as "I like your use of..." "Your writing was powerful when/ because..." and "I didn't understand what you meant by..."

Comments: Although none of the Practice Test items relate specifically to this standard, many of them rely on students' standards and judgments regarding quality writing. A number of items ask students to select the best example from a number of sentence constructions, or to determine the most effective placement of a sentence in a paragraph. Test items 7 and 15 require students to write short pieces, then revise and proofread them.

Documenting sources

- Whenever students are writing, have them credit films, magazines, internet resources, texts, encyclopedias, art, articles, stories, etc. using whatever format is suggested by your school district.

Composing and editing using a word processing program

- Students should be able to perform the basic functions of word processing. This includes use of spelling, thesaurus, and grammar tools; how to set tables, columns, margins, and fonts; how to format text and set footnotes and page numbers; how to copy and paste, print, etc.
- Suggested activities under standards W3.4a and W3.5 are examples of how students might use word processing.



PART THREE

Mathematics

PART THREE
MATHEMATICS

MATHEMATICS STANDARDS & ASSESSMENT

WHAT THE MATHEMATICS TEST WILL BE LIKE

The Mathematics Test of the Grade 8 Alaska Benchmark Examination will assess students' ability to:

- use numbers to measure, estimate, and compute;
- understand mathematical functions and relationships;
- use basic statistics and probability theory;
- use mathematics to reason, solve problems, and communicate; and
- use geometry to solve problems involving points, lines, angles, surfaces and solids.

TYPES OF QUESTIONS

The Mathematics Test will include:

- about 30 multiple-choice questions in which students will be asked to select the best answer from a list of three or four possible answers;
- about five short “constructed-response” questions that will ask students to respond to various tasks by writing their final answers in words or numbers, completing a graph, showing their work, or justifying their answers;
- one extended “constructed-response” question asking students to show a considerable amount of their work, or supply detailed justification for answers to a multi-step problem.

HOW TEST QUESTIONS RELATE TO KEY ELEMENTS OF THE MATHEMATICS STANDARDS

There are five Alaska Content Standards for Mathematics (*These can be found on the Department of Education & Early Development web site (www.eed.state.ak.us) under “Standards for Student Learning”; and in the booklet Standards for Alaska Students, under “Alaska Content Standards—Mathematics,” Alaska Department of Education & Early Development, February 1999*).

The first mathematics content standard (Standard A) is: “A student should understand mathematical facts, concepts, principles, and theories.” Standard A describes six key elements that encompass the six basic “strands” of content in mathematics. They include:

- A1—Numeration
- A2—Measurement
- A3—Estimation and Computation
- A4—Functions and Relationships
- A5—Geometry, and
- A6—Statistics and Probability.

Content standards B through E describe “process” skills and abilities. They include: B) problem-solving, C) communication, D) reasoning, and E) connections.

Performance standards for students are grouped under the six key elements encompassed in Mathematics Content Standard A and the four “process” skills encompassed in Content Standards B through E. (*These are also spelled out on the Department of Education & Early Development web site and in the booklet Standards for Alaska Students.*) There are 46 specific performance standards in mathematics for students ages 11-14; however, in many instances, student performance can be assessed on more than one of these standards at a time.

For example, there are five specific performance standards under the Numeration strand. Questions that assess students on each of those five performance standards have been grouped together on the Mathematics Test to form a single measurement of how well students understand numeration. Similarly, questions assessing students on each of the six performance standards under Ge-

ometry have been grouped together to form a single measurement of how well students understand geometry.

The same is true of questions measuring the other four key elements—Measurement, Estimation and Computation, Functions and Relationships, and Statistics and Probability. In fact, some questions assess more than one key element—requiring students to use functions and relationships, for example, at the same time they use estimation and computation. There are many crossovers.

There are also no test questions that are specific only to the “process” standards B through E, Problem-solving, Communication, Reasoning, and Connections. Students are assessed on these standards in the same questions used to assess their performance on the six key elements. For example, some questions may assess students’ problem-solving while using geometry. Some may assess students’ reasoning with questions involving functions and relationships, or probability and statistics.

SCORING

Students’ answers to multiple-choice questions on the Mathematics Test will be scored according to an answer key. Correct answers will receive one point; incorrect answers will receive no points.

Students’ answers to short and extended “constructed-response” questions will be rated on the basis of scoring guides specific to the question being asked. *(See examples in the scoring guides following the Mathematics Practice Test in Appendix 2 of this guide.)*

REPORTING STUDENTS’ SCORES

Each student’s report of results from the Mathematics Test will contain:

- an overall score
- one of four proficiency ratings:
 - advanced
 - proficient
 - below proficient
 - not proficient
- detailed information about performance for each of the six key elements and the four “process” standards. The report will not include information about student results on each of the performance standards within each content strand or “process” standard because there are too few test questions addressing each specific performance standard.

Scores from questions that measure both a content strand standard and a “process” standard will be used twice, once in the score for the content strand and again in the score for the “process” standard to which the question applies.

(For more information about proficiency levels and how student scores relate to performance standards, see the Proficiency Descriptors in Appendix 3 at the back of this guide.)

RESOURCES PROVIDED WITH THE TEST

All necessary materials will be provided with the test. Students are not allowed to use calculators, except in some cases, as in accommodations for students with disabilities. *(See Participation Guidelines for the Inclusion of Special Education and LEP Students in State Assessments under “Student Testing” on the Department of Education & Early Development web site (www.eed.state.ak.us).)*

TIME ALLOWED FOR THE TEST

Students may take as long as they need to complete the Mathematics Test, but most students should be able to finish in 2 to 3 hours.

PREPARING STUDENTS to Meet Specific Standards in Mathematics

This section describes activities that teachers can use to help their students meet each of the Mathematics Performance Standards for students ages 11-14 (tested on the Grade 8 Benchmark Examination). Suggested activities are keyed to specific performance standards, which are spelled out in the lefthand column adjacent to them.

This section also includes sample test items from the Mathematics Practice Test for Grade 8, and some explanations of how specific test items relate to specific performance standards.

(The Alaska Mathematics Performance Standards for students at all age levels can be found in Appendix 1 at the back of this guide; on the Department of Education & Early Development web site (www.eed.state.ak.us) under “Standards for Student Learning”; and in the booklet Standards for Alaska Students, Alaska Department of Education & Early Development, February 1999.)

(The complete Mathematics Practice Test and Scoring Guides for the Grade 8 Benchmark Exam can be found in Appendix 2.)

KEY ELEMENT 1. Numeration

PURPOSE

The ability to make sense of numbers permeates all aspects of mathematics. “Number sense is both the ability of the learner to make logical connections between new information and previously acquired knowledge and the drive within the learner to make forming these connections a priority.” (*NCTM Addenda Series, Grades 5–8, Developing Number Sense, 1992*) A student with a deep understanding of numeration will:

- understand the meaning of numbers,
- have an awareness of multiple relationships among numbers,
- recognize the relative magnitude of numbers,
- know the relative effect of operating on numbers, and
- possess referents for measures of common objects and situations in the environment.

SUGGESTED ACTIVITIES

PERFORMANCE STANDARD: A1.3.1

Students can read, write, model, and order real numbers, explaining scientific notation, exponents, and percents.

Reading, writing, modeling, and ordering real numbers

- Compare the distances of the planets to the sun using scientific notation and exponents.
- Use temperatures from throughout the United States (-20°F to 80°F) to order real numbers.
- Have students place on number line square roots, decimals, π , fractions, etc.
- Use concrete representations of numbers such as fraction strips, number lines, 10×10 grids, area models, and objects.

PERFORMANCE STANDARD: A1.3.2

Students can model counting in a different base system.

PERFORMANCE STANDARD: A1.3.3

PERFORMANCE STANDARD: A1.3.4

Students can translate between equivalent representations of the same number. They can select a representation that is appropriate for the situation.

SAMPLE PRACTICE QUESTION

2. A hardware store sells boxes of nails. The nails are $\frac{5}{8}$, $\frac{9}{16}$, $\frac{3}{4}$, and $\frac{1}{2}$ inch in length. If the boxes of nails are to be arranged by nail size from least to greatest, which of the following is the correct order?

- (A) $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{8}$, $\frac{9}{16}$
- (B) $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{3}{4}$
- (C) $\frac{3}{4}$, $\frac{5}{8}$, $\frac{9}{16}$, $\frac{1}{2}$
- (D) $\frac{3}{4}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{1}{2}$

Comments: Practice Test item 2 relates to standard A1.3.1 because students need to read and order fractions which are a subset of the real numbers.

Counting in different base systems

- Continue use of place value charts and base 10 blocks to deepen understanding of place value in base 10.
- Use measurement conversions such as: 60 minutes = 1 hour, 12 inches = 1 foot, and 1 year = 12 months.
- Use manipulatives to build different base systems. (Base 2 is essential for computer operating systems.)

There is no performance standard on this topic for students ages 11-14.

Using equivalent representations

- Convert between percent and fractions using discounts, nutritional information, probabilities, taxes, etc.
- Interpret and represent data using percents, decimals, and fractions.
- Gather data and create circle graphs.

SAMPLE PRACTICE QUESTION

10. The total area of Alaska is 591,000 square miles. Which of the following is 591,000 expressed in scientific notation?

- (A) 591×10^4
- (B) 5.91×10^5
- (C) 59.1×10^5
- (D) 5.91×10^6

Comments: Practice Test item 10 relates to standard A1.3.4 because 5.91×10^5 is an equivalent representation of 591,000. It also addresses standard A1.3.1 because students need to write a real number, 591,000, in scientific notation.

PERFORMANCE STANDARD: A1.3.5

Students can describe and model the relationship of fractions to decimals, percents, ratios, and proportions.

PERFORMANCE STANDARD: A1.3.6

Students can use, explain, and define the rules of divisibility, prime and composite numbers, multiples, and order of operations.

PERFORMANCE STANDARD: A1.3.7

Students can use commutative, identity, associative, and distributive properties with variables.

Understanding the relationship of fractions to decimals, percents, ratios, and proportions

- Use decimals, percents, and proportions to solve distance, time, and rate problems.
- Using two-dimensional figures find similar shapes using ratio and proportion.
- Given two similar plane figures compare the areas of the figures or the perimeters of the figures.

Using divisibility rules, prime and composite numbers, multiples, and order of operations

- Do Sieve of Erastosthenes (the activity designed to quickly identify prime numbers in an arbitrarily large set of integers).
- Find prime factorizations using various methods such as factor trees and repeated division.
- Use manipulatives to show prime and composite using rectangular arrays.
- Construct factor lattices.
- Investigate Pascal's Triangle.
- Write number sentences that describe situations. Solve using order of operations.

Using properties of real numbers

- Define root words of properties (that is, associative: root word associate).
- Use mental math games to apply grouping of numbers.
- Use distributive property to simplify multiplication tasks such as:
 $3 \times 53 = 3 \times 50 + 3 \times 3$ and $3 \times 2\frac{1}{2} = 3 \times 2 + 3 \times \frac{1}{2}$

Comments: Practice Test item 3 relates to standard A1.3.7 because students need to know how to use the distributive property with variables.

KEY ELEMENT 2. Measurement**PURPOSE**

Students encounter measurement ideas both in and out of school. Measurement experiences provide a dynamic interaction between students and their environment, demonstrating practical applications of mathematics. A student with a deep understanding of measurement will:

- choose and use the compatible units for the attributes being measured,
- select appropriate units and scales on the basis of the precision desired,
- solve problems involving the perimeter and area of two-dimensional shapes and the surface area and volume of three-dimensional objects, and
- use ratio and proportion to solve problems involving scaling, similarity, and derived measures.

SUGGESTED ACTIVITIES

PERFORMANCE STANDARD: A2.3.1

Students can estimate and measure various dimensions to a specified degree of accuracy.

PERFORMANCE STANDARD: A2.3.2

Students can estimate and convert measurements within the same system.

PERFORMANCE STANDARD: A2.3.3

Students can use a variety of methods and tools to construct and compare plane figures.

PERFORMANCE STANDARD: A2.3.4

Students can describe and apply the relationships between dimensions of geometric figures to solve problems using indirect measurement; they can describe and apply the concepts of rate and scale.

Estimating and measuring to a specified degree of accuracy

- Compare the surface areas and volumes of several different sizes of milk cartons.
- Measure body parts of several students and find average size of students.
- Use CBL's (Calculator Based Labs) to measure time and distance, and plot points on graph.
- Have an "estimation fair."
- Choose how accurate you must be when measuring such items as the perimeter of the school, length of a pencil, materials for building projects.

Converting measurements within the same system

- Figure the interest on an account over a period of time.
- Hold a "Metric Olympics" in your classroom, recording results in multiple measures such as meters and centimeters.

Comments: Practice Test Item 17 relates primarily to standard A3.3.6 because students would set up a proportion using the ratio of gallons to tons. Then they would convert tons to pounds, which would involve standard A2.3.2, converting measurements within the same system.

Constructing and comparing plane figures

- Create scale drawings, house plans, models.
- Construct plane figures on geoboards and compare their areas.
- Using a length of string tied to a pencil as a radius, draw a circle. Varying the length of the string, draw more circles and compare areas.

Using indirect measurement, and applying rate and scale

- Use similar triangles to find various heights and distances. (Knowing the height of a person, determine the height of a tree using similar triangles.)
- Have students walk along a 10-meter tape using baby steps, normal steps, and giant steps. Figure rate for each trip.
- Calculate the density of various objects.
- Discover π by using string to measure and compare diameters and circumferences of circular shapes.
- Use monetary exchange rates to find the cost of various items in different countries.
- Look for passages in *Gulliver's Travels* (by Jonathan Swift) that imply scaling, similarity, and proportionality.

SAMPLE PRACTICE QUESTION

6.  Use your ruler to help you solve this problem.

For a social studies project, Ryan made a scale drawing of Anchorage. He used a scale of 1 centimeter = 2 kilometers. The segment below represents the distance between Knik Arm and the University on his scale drawing.



NOTE: The dimensions of the art your printer produces may be slightly different from the original art.

According to Ryan's scale, what is the approximate distance, in kilometers, between Knik Arm and the University?

- (A) 2 kilometers
- (B) 4 kilometers
- (C) 6 kilometers
- (D) 8 kilometers

Comments: Practice Test item 6 relates to standard A2.3.4 because students use the scale of 1 cm = 2 km to find the actual distance of a length shown on a map. Because students need to use a ruler to measure the length, standard A2.3.1 is also addressed.

PERFORMANCE STANDARD: A2.3.5

Students can apply information about time zones and elapsed time to solve problems.

Solving problems about time

- Have students plan a pretend conference call with people from Alaska, New York, and England. Have them determine the best time for this call and defend their choices.
- Plan a trip from Alaska to New Zealand. Give departure times, arrival times, and elapsed times for all legs of the trip.
- Using start and stop time data from a track meet, determine elapsed time.
- Using the current date and birth dates, determine the ages of individuals to the nearest day. Use dates from BC to AD to determine elapsed time to the nearest year.

SAMPLE PRACTICE QUESTION

11. Lynn ran a marathon in 3 hours, 9 minutes, and 18 seconds. Amy ran the same marathon in 2 hours, 59 minutes, and 11 seconds. How much more time did it take Lynn than Amy?
- (A) 9 minutes and 57 seconds
 - (B) 10 minutes and 7 seconds
 - (C) 1 hour, 10 minutes, and 3 seconds
 - (D) 1 hour, 50 minutes, and 3 seconds

Comments: Practice Test item 11 relates to standard A2.3.5 because the problem deals with elapsed time. Depending on how a student approaches the problem, he/she may convert hours to minutes, which would address standard A2.3.2.

**PERFORMANCE
STANDARD: A2.3.6**

There is no standard on this topic for students ages 11-14.

KEY ELEMENT 3. Estimation and Computation

PURPOSE

A student's understanding of numeration and the meanings of arithmetic operations should be firmly established so they will be useful in problem situations. A student with a deep understanding of estimation and computation will be able to:

- compute efficiently and accurately with fractions, decimals, percents, and integers;
- decide when an exact answer or an estimate would be more appropriate;
- choose the best computational method for a given situation; and
- analyze answers to computations to evaluate their reasonableness.

SUGGESTED ACTIVITIES

**PERFORMANCE
STANDARD: A3.3.1**

Students can apply, explain, and assess the appropriateness of a variety of estimation strategies including truncating and rounding to compatible numbers.

Using a variety of estimation strategies

- Have students use different types of calculators and see which calculators truncate and which round.
- Have students estimate lengths, weights, and heights using a variety of strategies.
- Ask students to investigate the use of approximate and exact numbers in newspaper articles.
- Ask students to think about situations when exact values are needed and other situations when approximate values are necessary and useful.

**PERFORMANCE
STANDARD: A3.3.2**

Students can apply basic operations efficiently and accurately, using estimation to check the reasonableness of results.

Using estimation to check the reasonableness of results

- Have students estimate various amounts such as populations, budgets, weights, etc., then have them research the exact amounts.
- Use context to determine reasonable values: Have students find a news story with numerical data. Then blank out the data and give it to another group of students who try to replace the blank with reasonable values.
- Display various news clippings or advertisements. Ask students to evaluate them for their reasonableness. Do they make sense? Why or why not?

SAMPLE PRACTICE QUESTION

1. David's teacher asked him to solve the problem shown below.

$$(-125 + 175) + (-125 + 165) + 110$$

David's answer of 190 is incorrect. What is the correct answer?

- (A) 150
- (B) 160
- (C) 200
- (D) 210

Comments: Practice Test item 1 relates to standard A3.3.2 because students need to perform basic addition with integers. If a student were to rearrange the numbers he/she would be using the associative and commutative properties that are addressed in standard A1.3.7.

PERFORMANCE STANDARD: A3.3.3

Students can add and subtract fractions, decimals, and percents.

Adding and subtracting fractions, decimals, and percents

- Add various lengths that are mixed numbers.
- Reconcile checkbooks.

Comments: Practice Test Item 13 relates primarily to standard A4.3.1 because students need to identify a numeric pattern, find the next term and the next, and so on until \$30.00 is reached. This question also requires the students to add decimals (standard A3.3.3) and to collect and organize data (standard A6.2.1).

PERFORMANCE STANDARD: A3.3.4

Students can multiply and divide rational numbers in various forms including fractions, decimals, and percents.

Multiplying and dividing fractions, decimals, and percents

- Display a number line with several fractional points indicated by letters. Ask students questions such as "What point on the number line would best represent the product of the fractions represented by D & E?" or "Estimate the product of 20 and the number represented by C."
- Have students answer questions such as: If $a > 1$, $0 < b < 1$, and $0 < c < 2$; fill in the blanks with $<$, $=$, $>$, or "can't tell." $a \cdot b$ a , $b \cdot c$ b , $a \div c$ a , c/c a , etc.
- Give students a list of multiplication and division of decimal problems with the answers given except for the decimal point. Have students use estimation to place the decimal correctly.
- Play "Target Multiplication." Give students a target range and a starting value such as "Start with 36, and your Target Range is 2000-2100." One person enters 36 into the calculator and presses "x". Another person estimates a number that when multiplied by 36 will produce a product in the target range. For example, suppose a student estimates 50. The product (1800) misses the target range. Another student must now estimate a factor to multiply by the new number, 1800, to produce a product in the target range. Suppose a student estimates 1.2. The product is 2160, which is too large. Play continues in this manner until a student makes an estimate that produces a product in the target range. The "score" for the game is the number of guesses needed to hit the target range. (See *NCTM Addenda series, Grades 5-8: Developing Number Sense*, p 39.)

PERFORMANCE STANDARD: A3.3.5

Students can convert between equivalent fractions, decimals, percents, and proportions. They can convert from exact to decimal representations of irrational numbers.

PERFORMANCE STANDARD: A3.3.6

Students can solve problems using ratios and proportions.

SAMPLE PRACTICE QUESTION

12. Ms. Sanchez has $\frac{2}{3}$ of a quart of oil to divide evenly between 3 snow machines. Which expression can she use to determine the fraction of a quart of oil each snow machine will receive?

- (A) $\frac{2}{3} \times \frac{1}{3}$
- (B) $\frac{2}{3} \div \frac{1}{3}$
- (C) $\frac{2}{3} \times 3$
- (D) $\frac{3}{2} \times 3$

Comments: Practice Test item 12 relates to standard A3.3.4 because students need to understand the process of multiplying and dividing rational numbers in fraction form.

Converting between fractions, decimals, and percents

- Convert between fractions, decimals, and percent when calculating discount on an item, taxes, commissions, tips, etc.
- Use nutritional information to find the percentage of daily needs in grams.
- Give students a copy of a circle graph divided into 5 unequal parts. Ask them to estimate the size of each section as a percent of the circle. Discuss which sections are easy to estimate and which are not.
- List a quantity such as 20% of 40 and then give four other values such as 40% of 20, $\frac{1}{10}$ of 80 and $.05 \times 20$. Ask students to choose the item that is not equivalent to the original and explain.
- On a 0-99 chart ask students to estimate the percentage of numbers that have certain characteristics such as “are multiples of 3,” or “contain only odd digits,” etc. Write as fractions and decimals also.

Using ratios and proportions to solve problems

- Using two-dimensional figures, find the dimensions of similar shapes using ratio and proportion.
- Describe relationships between area and perimeter using ratio and proportion.
- Solve problems involving dimensions of scale drawings, missing rates, unit pricing, etc.

SAMPLE PRACTICE QUESTION

17. A factory uses 220,000 gallons of water to produce 2 tons of steel. How many gallons of water are needed to produce 1 pound of steel?

- (A) 55 gallons
- (B) 110 gallons
- (C) 110,000 gallons
- (D) 440,000 gallons

Comments: Practice Test item 17 relates to standard A3.3.6 because students would set up a proportion using the ratio of gallons to tons. Then they would convert tons to pounds, which would involve standard A2.3.2, converting measurements within the same system.

KEY ELEMENT 4. Functions and Relationships

PURPOSE

In order to analyze and solve problems involving unknown quantities students must be comfortable relating symbolic expressions involving variables to verbal, tabular, and graphical representations. A student with a deep understanding of functions and relationships will:

- recognize situations in which problems and decisions involve relations among variables,
- relate and compare different forms of representation (tables, graphs, or equations) for a relationship, and
- recognize patterns of change associated with linear and nonlinear functions and contrast their properties from tables, graphs, or equations.

SUGGESTED ACTIVITIES

PERFORMANCE STANDARD: A4.3.1

Students can identify numeric and geometric patterns to find the next term and predict the n th term.

Identifying patterns and predicting the n th term

- Use the “Banquet Table” problem: How many guests can be seated at a banquet table if there are one, or two, or three, or four... tables placed end to end in a single row? Tables can be squares, triangles or any polygon. Have students create a table and predict the n th term.
- Investigate the perimeter or areas of trains formed by using one or more of the same congruent regular polygons; for example: one pentagon, two pentagons, three pentagons, The perimeter pattern is 5, 8, 11, ... $3n+2$
- Use the “Handshake” problem: How many different handshakes are possible in a room of two, three, four... n people? Have students describe strategies. (Number of telephone calls, number of intersection points for a given number of linguini pieces, and number of segments connecting non-collinear points can also be used.)
- Fibonacci Numbers: How many pairs of rabbits can be produced each month in a year from a single pair if each adult pair gives birth to a new pair every month? Rabbits do not reproduce in the first month of their lives, but they do in the second. Assume no rabbits die.

SAMPLE PRACTICE QUESTION

13. Jasmine needs \$30 to buy a sweater. She uses the following plan to save money. The first day she sets aside \$1. The second day Jasmine sets aside \$1.50. The third day she sets aside \$2, and on the fourth day she sets aside \$2.50. If Jasmine continues this pattern, on which day will she have enough money to buy the sweater?

- (A) day 8
- (B) day 9
- (C) day 10
- (D) day 11

Comments: Practice Test item 13 relates to standard A4.3.1 because students need to identify a numeric pattern, find the next term and the next, and so on until \$30.00 is reached. This question also requires students to add decimals (standard A3.3.3) and to collect and organize data (standard A6.2.1). Practice Test item 5 also relates to standard A4.3.1 because students need to identify a numeric pattern, find the next term, and predict the n th term.

PERFORMANCE STANDARD: A4.3.2

Students can identify and describe how a change in one variable in a function affects the remaining variables (for example, how changing the length affects the area and volume of a rectangular prism).

Describing how a change in one variable affects remaining variables

- Investigate how the perimeter of a rectangle changes when area stays the same and vice-versa. Have students make tables and graphs comparing several relationships such as length vs. area, length vs. width, length vs. perimeter, etc.
- How does the height of a ramp affect the time it takes a toy car or ball to go down the ramp?
- How does the length of the string affect the time of the swing of the pendulum?
- How does the number of marbles in a jar affect the amount of water in the jar?

SAMPLE PRACTICE QUESTION

18. Donnie wants to enlarge a photograph that measures 3 inches by 5 inches. If both dimensions are doubled, what happens to the *area* of the photograph?

- (A) It is doubled.
- (B) It is multiplied by 4.
- (C) It remains the same.
- (D) It is multiplied by 8.

Comments: Practice Test item 18 relates to standard A4.3.2 because students need to describe how changes in length and width affect the area of a rectangle.

PERFORMANCE STANDARD: A4.3.3

Students can use a calculator to find a missing item in an arithmetic and geometric sequence; they can predict the graph of each function.

Predicting the graph of a function and using a calculator to find missing items in a sequence

- Draw graphs of relationships such as those in the suggested activities for standard 4.3.2. Have students make predictions about the graphs.
- Investigate and make predictions about what happens when different-sized cubes are constructed from unit cubes, the surface area is painted, and the large cube is then disassembled into its original unit cubes. How many of the unit cubes have paint on three faces, two faces, one face, and no face? Put the information in a table to better view the patterns.

PERFORMANCE STANDARD: A4.3.4

Students can translate among and use tables of ordered pairs, graphs on coordinate planes, and linear equations as tools to represent and analyze patterns.

Using tables, graphs, and equations to represent and analyze patterns

- Build a relationship between the rate of a turtle traveling at 5 feet per minute and a snail traveling at 3 feet per minute. Have students begin by investigating the relationship on number lines, in a table, with words and symbols, and on a coordinate grid. ((<http://pec2.jun.alaska.edu:591/tic/>) search using “unit synopsis contains: **Choike**”)
- Have students compare the cost of buying various numbers of tee-shirts, with or without screening fees, by investigating the relationship on number lines, in a table, with words and symbols, and on a coordinate grid. (Compare prices of calling card plans, renting videos, cell phone rates, club memberships, etc.)

PERFORMANCE STANDARD: A4.3.5

Students can find the value of a variable by evaluating formulas and algebraic expressions for given values.

Evaluating formulas and expressions

- Find the area of a two-dimensional shape using a formula.
- Given the area of a circle have students find the circumference.
- Using the time/rate/distance formula, have students determine the value of one variable when given the other two.

SAMPLE PRACTICE QUESTION

4. The formula for the perimeter (P) of a rectangle is $P = 2l + 2w$, where l represents the length and w represents the width. What is the perimeter of a rectangle that has a length of 7 centimeters and a width of 4 centimeters?

- (A) 11 centimeters
- (B) 18 centimeters
- (C) 22 centimeters
- (D) 28 centimeters

Comments: Practice Test item 4 relates to standard A4.3.5 because students are finding the value of a variable, P , by evaluating the expression $2l + 2w$.

KEY ELEMENT 5. Geometry**PURPOSE**

Geometry provides an environment for using reasoning strategies including informal inductive and deductive reasoning. A student with a deep understanding of geometry will:

- precisely describe, classify, and understand relationships among types of two- and three-dimensional objects,
- create and critique inductive and deductive arguments concerning geometric ideas and relationships,
- specify locations and describe relationships using coordinate geometry, and
- apply transformations and use symmetry to analyze mathematical situations.

SUGGESTED ACTIVITIES**PERFORMANCE STANDARD: A5.3.1**

Students can identify, classify, compare, and sketch regular and irregular polygons.

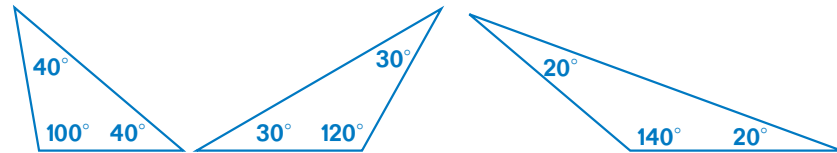
Identifying, classifying, and comparing polygons

- Write a letter to a friend explaining and describing what a rectangle is, how to find the area of a rectangle, and why the stated procedure works.
- Use geostrips to investigate properties of triangles and quadrilaterals including rigidity.
- Measure and record sides and angles of various equilateral, isosceles, scalene, and right triangles. Make conjectures about each of the triangles.
- Give a group of 4 to 5 students a loop of heavy yarn approximately 4 meters long. Each member of the group must have both hands touching the yarn

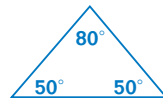
at all times. The challenge is to make geometric figures with the yarn such as: isosceles triangle, square, trapezoid, etc. How can you be sure the sides are parallel? At right angles? etc. (See *NCTM Addenda Series, Grades 5-8: Geometry in the Middle Grades*, pg 60.)

SAMPLE PRACTICE QUESTION

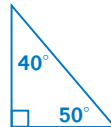
7. Carl drew the triangles shown below.



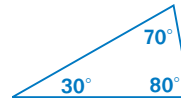
Carl concludes that all isosceles triangles are obtuse. Which of the triangles below proves Carl to be incorrect?



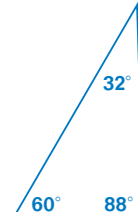
(A)



(B)



(C)



(D)

Comments: Practice Test item 7 relates to standard A5.3.1 because students need to identify isosceles triangles and classify them as obtuse or acute.

PERFORMANCE STANDARD: A5.3.2

Students can model, identify, draw and describe three-dimensional figures including tetrahedrons, dodecahedrons, triangular prisms, and rectangular prisms.

Modeling and describing geometric solids

- Given a set of six adjoining squares, determine all arrangements that can be folded to form a cube.
- Using concept cards on which both examples and non-examples of particular shapes are shown, have students decide which of further illustrations are examples of the shape (such as “trapezoid”). Finally, have them verbalize a description or rule for the shape.
- Make skeletal models of prisms, pyramids, or other three-dimensional figures using toothpicks (or stir sticks or pipe cleaners) and mini-marshmallows (or gumdrops). Have students identify skew lines, parallel lines and planes, number of vertices, edges, and faces in the figures. Use a table to investigate the number of vertices, faces, and edges and describe any patterns. Students should be able to find the number of edges given the number of vertices and faces; or, given the base of a pyramid, find the number of its edges, faces, and vertices. (Euler’s formula)

PERFORMANCE STANDARD: A5.3.3

Students can apply the properties of equality and proportionality to solve problems involving congruent or similar shapes.

Solving problems involving congruent or similar shapes

- Create a rectangle on a geoboard. Cut it in half in as many ways as you can. Ask questions about shapes of halves such as: Are they congruent? Explain using transformations. Which ones are symmetrical? Calculate areas to prove halves are equal.
- Use similar triangles to find unknown distances; for example, determine the height of the school building on a sunny day.

**PERFORMANCE
STANDARD: A5.3.4**

Students can estimate and determine volume and surface area of solid figures using manipulatives and formulas; they can estimate and find circumferences and areas of circles.

Estimating and finding volume and surface area of solids, and circumference and area of circles

- Find the volumes and surface areas of two different sizes of raisin boxes. Compare the relationship and discuss the implications for packaging with respect to the consumer as well as the manufacturer. Discuss pricing in terms of consumer and manufacturer.
- Given a map of a lake drawn to scale, have students plan for a housing development along the lakeshore whose lots must each have 100 feet of lakefront. Using historical information about the area the lake covered 30 years ago, determine for the buyers whether the lake has shrunk or grown over time. (*Connected Mathematics: Covering and Surrounding*. Dale Seymour Publications, p 26.)
- Investigate the goat problem: A goat is tethered to a stake. Given the length of the tether, determine the area of grass available to the goat. Variations include tethering the goat to the corner of a shed, the side of the shed, and with shorter or longer tethers.
- Find and compare volumes of cylinders created using pieces of notebook paper rolled lengthwise and widthwise.

SAMPLE PRACTICE QUESTION

9. Tracy is going to paint the outside of a box to give as a gift. The box is 3 inches long, 4 inches wide, and 5 inches high. What is the surface area, in square inches, of the box? Show your work and write your answer in the box below.

Answer: _____ square inches

Tracy is going to fill the box with candy. She needs to know how much candy the box will hold. What is the volume, in cubic inches, of the box? Show your work and write your answer in the box below.

Answer: _____ cubic inches

Comments: Practice Test item 9 relates to standard A5.3.4 because students need to determine the surface area and volume of a rectangular prism.

PERFORMANCE STANDARD: A5.3.5

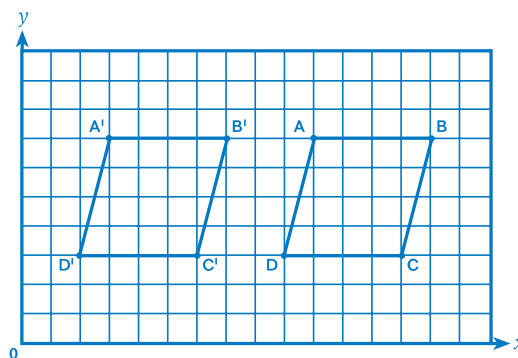
Students can draw and describe the results of transformations including translations (slides), rotations (flips), and dilations (shrinking or enlarging).

Drawing and describing translations

- Begin with a picture and create a grid on it. Using the same scale grid paper make an enlargement of the picture.
- Examine simple folk songs. Looking at the sheet music identify translations, rotations, and reflections from measure to measure. Follow up by having students create their own songs, using a given set of notes and transformations for subsequent measures.
- Have students make a simple, non-regular geometric figure on coordinate axes. Label its vertices (A, B, C, \dots). Transform the figure by sliding 4 units right, flipping over a vertical line, and rotating 90° about a certain point. Have students label the new points (A', B', C', \dots) and create a table of original and new coordinates. Investigate the relationship between old and new coordinates. Follow up using geometry software.

SAMPLE PRACTICE QUESTION

8. Parallelogram ABCD was translated to parallelogram $A'B'C'D'$.



How many units and in which direction were the x-coordinates of parallelogram ABCD moved?

- (A) 3 units to the right
- (B) 3 units to the left
- (C) 7 units to the right
- (D) 7 units to the left

Comments: Practice Test item 8 relates to standard A5.3.5 because students need to describe the translation as moving 7 units to the left. In order to answer this problem correctly, students need to understand that **A** is a point of the original figure and **A'** is the corresponding point of the translation.

PERFORMANCE STANDARD: A5.3.6

Students can use coordinate geometry to represent and interpret relationships defined by equations and formulas including distance and midpoint.

Using coordinate geometry to find distances and midpoints and to represent equations and formulas

- Follow a treasure map: You have found an old map that says a treasure is buried 10 meters from a marked rock in a nearby park. Where would you look for the treasure? What if you find an additional clue that says the treasure is also 8 meters from a famous old tree in the park. Would you change your plans for digging for the treasure? Explain. (See *NCTM Agenda Series, Grades 5-8: Geometry in the Middle Grades*, pg 25.)
- Locate the midpoint: Given points on a coordinate grid, have students find half the vertical distance and half the horizontal distance between two points to locate a midpoint and give its coordinates.

**PERFORMANCE
STANDARD: A5.3.7**

Students can draw, measure, and construct geometric figures including perpendicular bisectors, polygons with given dimensions and angles, circles with given dimensions, perpendicular and parallel lines.

- Use a coordinate grid with four quadrants to represent a map of a city. The grid lines are the roads; and landmarks, such as city hall, museum, gas station, and skate park, are at some intersections. Ask questions such as: How far will a taxi drive from city hall to the hospital? How far will a helicopter have to fly? How much farther is it by car than by helicopter? Will the helicopter distance between two locations always be shorter? Find the landmarks that are 7 blocks from city hall by car. Place the middle school so that it is halfway between the hospital and the skate park by car and label the coordinates. Place the middle school so that it is halfway between the skate park and the hospital along a direct path between them (midpoint).

Drawing and constructing geometric figures with specific attributes

- Design a logo, building, bedroom remodel, graphic, etc., containing specific geometric figures.

KEY ELEMENT 6. Statistics and Probability**PURPOSE**

The skills necessary to become informed citizens and intelligent consumers include an ability to reason statistically. These skills involve data analysis and aspects of probability. A student with a deep understanding of statistics and probability will:

- design simple surveys and experiments;
- gather, graph, and summarize data;
- use basic measures of center and spread (mean, median, mode, and range);
- understand the correspondence between data sets and their graphical representations;
- use and make conjectures about relationships among populations and variables; and
- design experiments and compute probabilities for simple and some compound events.

SUGGESTED ACTIVITIES**PERFORMANCE
STANDARD: A6.3.1**

Students can collect, analyze, and display data in a variety of visual displays including frequency distributions, circle graphs, box and whisker plots, stem and leaf plots, histograms, and scatter plots with and without technology.

Collecting, analyzing, and displaying data in a variety of ways

- Give each group of students a bag of M&M's®. They predict the number of M&M's of each color in the bag and the total number of M&M's in the bag. Have them open the bag and record the number of M&M's of each color and the total number. Have each group create a pie chart representing the distribution of colors in their bag. Combine data for the class and create a pie chart for all the bags together.
- Give each student a small box of raisins. Before they open the box ask students to record how many raisins they think are in the box. Record their responses in a stem and leaf plot. Next, ask students to count their

raisins. Record their responses on the same stem and leaf plot, but on the left side this time, making it a back-to-back stem and leaf plot. Ask students to also display the data in a box plot and in a double bar graph. Ask students questions comparing the displays. Also ask them statistical questions about maximum, minimum, range, mode, median, mean, etc. Have students compare their data displays to those from another class.

- Use scatter plots to examine relationships between two characteristics of a population. For example, have students plot the data relating students' height to their arm spans in the class. The same data could be gathered from a group of older students. Students would note the upward tendency of the points and find a line of best fit. Finding the slope of the line on each set of data would allow students to analyze whether this relationship is the same for all students.

SAMPLE PRACTICE QUESTION

14. The data below shows how many hours the students in Mr. Morrison's health class sleep per night.

7, 9, 8, 8, 10, 7, 9, 6, 8, 7, 8, 9, 7, 8, 9

Use this data to complete the frequency table below.

HOURS OF SLEEP PER NIGHT

Number of Hours	Tally	Frequency
6	I	1
7	IIII	4

What is the mean number of hours that a student in Ms. Morrison's health class sleeps per night? Write your answer in the box below.

Answer: _____ hours

Comments: Practice Test item 14 relates to standard A6.3.1 because students need to display data in a frequency table, then analyze the data by finding the *mean*. A prerequisite skill would be knowing how to find the mean, median and mode (standard A6.2.3).

SAMPLE PRACTICE QUESTION

15. Mr. Wilson's class participated in a monthly fundraiser by selling snacks. The stem-and-leaf plot below shows the number of snacks each student sold.

SNACKS SOLD	
Stem	Leaf
2	2 5
3	1 3 6 9
4	0 2 4 6 7 8
5	4 5 5 6 7 8 9
6	5 8 9
7	1 4 5

KEY

3 | 6 means 36

How many students sold *more* than 55 packets of snacks?

- Ⓐ 10
Ⓑ 12
Ⓒ 13
Ⓓ 15

Comments: Practice Test item 15 relates to standard A6.3.1 because students need to analyze data displayed in a stem and leaf plot. Standard A6.3.2 is also addressed because students must interpret and analyze information found in a graphical display.

PERFORMANCE STANDARD: A6.3.2

Students can interpret and analyze information found in newspapers, magazines, and graphical displays.

Interpreting and analyzing information found in graphical displays

- Have students cut out and bring in various data displays from publications such as *USA Today* or *Consumer Reports*. Ask them questions about the statistics presented. Analyze data displays for validity.

PERFORMANCE STANDARD: A6.3.3

Students can determine and justify a choice of mean, median, or mode as the best representation of data for a practical situation.

Deciding whether mean, median, or mode is the best choice to describe data

- Present students with a situation in which they need to decide the appropriateness of using mean, median, or mode to best represent the central tendency of a set of data (for example, use wage earnings for employees in a company from the president of the company down to hourly workers.) Another example could use housing costs in a city where there are some very large expensive homes as well as low-income housing units. Students should figure the mean, median, and mode. Ask students relevant questions such as: If some of the hourly workers received a raise, which of the measures of central tendency would change? Would any stay the same? If union and management were negotiating for salary increases which measure would each side be most likely to use and why?
- Bring in newspaper articles and other sources of data summaries from the real world and discuss which measure of central tendency is used in an article, or which would best represent the center of the distribution of the data.

PERFORMANCE STANDARD: A6.3.4

Students can make projections based on available data and evaluate whether or not inference can be made given the parameters of the data.

PERFORMANCE STANDARD: A6.3.5

Students can use tree diagrams and sample spaces to make predictions about independent events.

Making projections and inferences from given data

- Determine the total number of beans in a bucket. Select a handful of beans, count and mark them. Return them to the bucket and mix them in. Select another handful of beans and determine the ratio of marked beans to the total number of beans in the handful. Using proportions find the total number of beans in the bucket. Repeat this procedure five times. Find the average of the five totals.
- Invite a professional in wildlife populations to share with the class how animal populations are counted.
- Give students a hypothetical situation such as the following:

A medical test for a particular disease that occurs in 1 percent of the population has been found to be 97 percent accurate. Suppose the test were run on you, and your results were positive. How concerned would you be about actually having the disease? (See *NCTM Addenda Series, Grades 5-8: Dealing with Data and Chance*, p 33-37.)

Ask several questions to make sure the students understand the situation. Then suppose there were 10,000 people sitting in an auditorium. Ask students to figure out how many people have the disease, how many tested positive, how many who actually tested positive have the disease, and what would your chances be of having the disease if you tested positive.

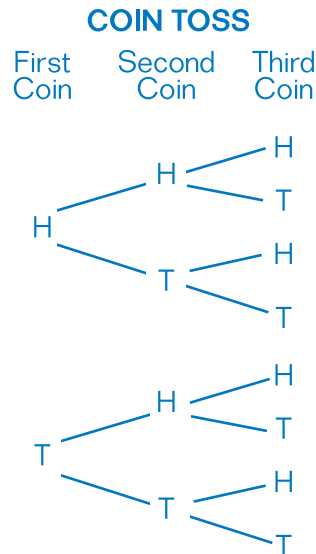
Finding probability of independent events

- Have students make tree diagrams to determine outcomes when tossing several coins, or selecting marbles from a jar, or selecting socks from a drawer. Then have them figure out the probabilities of various events such as tossing 2 heads and a tail, or selecting a red then a green marble, or getting a matched pair of socks.
- Give each student a piece of construction paper, 18" x 24". Have students make 11 columns on the paper and head the columns with the numbers 2 – 12. These numbers represent the sums of the numbers on a pair of dice. Give each student 18 peanuts to be positioned anywhere on his or her sheet. It doesn't matter how many peanuts are in any one column. Choose a student to shake the dice and read off the numbers. Students should quickly add them together. If they have a peanut in the column headed by the sum, they may remove that peanut. Only one peanut may be removed at any one time. The student who removes all his or her peanuts first is the winner. After a few games students begin to see which sums come up most often, and they begin to position their peanuts differently. A follow-up activity would be to have students find the probability of all the various sums on the dice.
- Place a number of red and blue cubes in a bag, and have two players or teams take turns reaching into the bag without looking, removing a cube, then replacing it. Work in pairs or in groups of four with two players on each team. One team is the red team, the other is the blue team. Teams take turns reaching into the bag, recording the color of the cube on a tally sheet, and replacing the cube. The winner is the team that has drawn the most cubes matching the team color. For the first round put 1 blue and 1 red cube in the bag. For the next round put in 2 blues and 2 reds. For the third round place 2 blues and 1 red in the bag. For the fourth round put in 3 blues and 1 red. Make tree diagrams for each round and discuss the fairness of the game. Then play the game with a "one-color" team and a "two-color" team. For the first round place 2 blue cubes and one red cube in the bag. Have students take out 2 cubes at a time and tally whether they are both one color or they are 2 colors. Replace the cubes before the other team picks. For the next round use 2 blues and 2 reds. For the third round

use 3 blues and 1 red. Before each round ask whether the teams feel the competition is fair. Then draw about 25 times per round and see whether the results confirm the students' thinking of fair or not. Have students create tree diagrams for each round.

SAMPLE PRACTICE QUESTION

16. Reggie tosses a coin three times in a row. The tree diagram below shows all possible outcomes, where H represents heads and T represents tails.



What is the probability that Reggie will toss two or *more* heads?

- Ⓐ $\frac{1}{8}$
- Ⓑ $\frac{3}{8}$
- Ⓒ $\frac{4}{8}$
- Ⓓ $\frac{7}{8}$

Comments: Practice Test item 16 relates to standard A6.3.5 because students need to use the tree diagram to make a prediction about the probability of tossing 3 coins.

PERFORMANCE STANDARD: A6.3.6

Students can design and conduct a simulation to study a problem and communicate the results.

Conducting a simulation study

- Simulate sampling populations. See first activity under A6.3.4.
- Simulate probability of getting a disease. See third activity under A6.3.4.



PART FOUR

Glossaries and Resources for Teachers

GLOSSARY—READING & WRITING

affix	a morpheme, or meaningful linguistic unit, that changes the meaning or function of a root or stem to which it is attached. In the word <i>adjoining</i> , for example, there are two affixes: the prefix <i>ad-</i> and the suffix <i>-ing</i> .
alphabetic principle	the assumption underlying alphabetic writing systems that each speech sound or phoneme of a language should have its own distinctive graphic representation
assertion	a declaration or positive statement of belief or opinion
cite	to quote as an authority; to give credit to those whose ideas or quotations are used in one's written or oral communications
composition	a short essay, usually produced as a school assignment
comprehension	as related to reading, the act of grasping the meaning of printed text. Involves understanding the literal meaning (<i>literal comprehension</i>), interpreting the suggested meaning (<i>inferential comprehension</i>), and evaluating what is read.
context clues	information from the immediate textual setting that helps identify a word. Used to help decode words being read for the first time; to resolve ambiguity (Does the word <i>duck</i> in this sentence mean an animal or the act of bending over?); and to confirm the accuracy of decoding (Does this word or group of words make sense and does it sound right?). When used with words that are already known, context clues help resolve which shade of meaning is intended in a particular situation (Is the word <i>progress</i> used as a noun or a verb?).
conventions	sets of rules or accepted practices in spoken or written language; commonly used to refer to spelling, punctuation, capitalization in writing
description	one of the four traditional forms of composition in speech and writing; meant to give a verbal picture of characters and events, including the setting in which they occur
discourse	a conversation; the act or result of making a formal written or spoken presentation on a subject, as in learned discourse or literacy; in linguistics, any form of oral or written communication more extensive than a sentence
edit	to revise or correct a manuscript. Generally used in the writing process to refer to correction of the mechanical features of writing such as spelling, punctuation, capitalization, etc., as part of the production of final drafts or preparation for publication. There are other levels of editing that focus on such qualities as organization, factual accuracy, consistency of tone, etc. (See <i>revise</i> .)
exposition	one of the four traditional forms of composition in speech and writing; intended to set forth or explain. Good exposition is clear in conception, well organized, and understandable. It may include limited amounts of argumentation, description, and narration to achieve this purpose.
expressive writing	highly personal writing, as in diaries, personal letters, autobiographies, etc.
fluency	the clear, easy expression of ideas in writing or speaking; freedom from problems or awkwardness that might hinder comprehension in silent reading or the expression of ideas in oral reading
four modes	the traditional forms of composition in speech and writing: exposition, narration, persuasion, and description (See definitions under each of these terms.)
genre	an established category of literature defined by its style, form, and/or content; short story, novel, drama, or poetry, for example
grammar	the system of rules that is generally accepted by a language community; includes inflection, word order, the structural aspects of sentences, and usage

high frequency words	words that appear many more times than most other words in spoken or written language. Basic word lists generally provide words ranked by their frequency of occurrence as calculated from a sample of written or spoken text suitable for the level of intended use.
infer	as related to inferential comprehension, to interpret meaning beyond the literal level of the text; to “read between the lines” and reach a conclusion or understanding based on evidence provided in the text
literal	as related to literal comprehension, meaning explicitly stated in the text
main idea	the gist of a passage; its central thought
narration (narrative)	one of the four traditional forms of composition in speech and writing; tells a story or gives an account of something, dealing with sequences of events and experiences, though not necessarily in strict order
persuasion (persuasive writing)	one of the four traditional forms of composition in speech and writing; meant to move the reader to a belief or proposition by using argument or entreaty
phoneme	a minimal sound unit of speech that, when contrasted with another phoneme, distinguishes words in a language. For example, <i>b</i> in <i>book</i> contrasts with <i>t</i> in <i>took</i> , <i>c</i> in <i>cook</i> , <i>h</i> in <i>hook</i> .
phonics	a system of teaching reading and spelling that stresses basic symbol-sound relationships and their application in decoding words; used especially in beginning instruction
phonemic awareness	awareness of the sounds (<i>phonemes</i>) that make up spoken words. Such awareness does not appear when young children learn to talk; it is not necessary for speaking and understanding spoken language. However, phonemic awareness is important for learning to read. In alphabetic languages, letters (and letter clusters) represent phonemes, and in order to learn the correspondences between letters and sounds, one must have some understanding of the notion that words are made up of phonemes.
phonetics	the study of speech sounds and their transcription into written form
point of view	the perspective from which an author tells his or her story. An author using an omniscient point of view knows and tells all, usually through the voice of a narrator. An author using a more restricted point of view may tell the story through, and from the perspective of, only one character.
prefix	an affix attached to the beginning of a word, such as <i>dis</i> in <i>discontinue</i>
pre-writing	the initial creative stage of writing, prior to drafting, in which the writer formulates ideas, gathers information, and considers ways to organize the writing
prior knowledge	knowledge that stems from previous experience. Prior knowledge is a key component of schema theories of reading comprehension.
readers' theater	performance of a story, play, or poetry in which one or more readers take the parts of characters and read rather than act out the parts, much like a radio play
revise	to make structural or content changes to a manuscript in order to improve clarity and effectiveness
root word	the meaningful base form of a complex word after all affixes are removed. A root may be independent (able to stand alone), like <i>read</i> in <i>unreadable</i> , or it may be dependent (unable to stand alone), like <i>-liter-</i> (from the Greek for <i>letter</i>) in <i>illiterate</i> .
semantics	the study of language that focuses on the meanings of words, phrases, sentences, paragraphs, and whole pieces of writing
sentences (three basic kinds)	declarative makes a statement exclamatory makes a vehement statement or conveys strong or sudden emotion interrogative asks a question or makes an inquiry
sight recognition	the immediate recognition of a word as a whole (See <i>sight word</i>)

sight word	a word that is immediately recognized as a whole and does not require word analysis for identification
syntax	the way in which words are put together to form phrases, clauses, or sentences
suffix	an affix at the end of a word, such as <i>ing</i> in <i>fixing</i>
T chart	a table that helps students organize their thinking by listing two things being compared in adjacent columns. When the name of one thing and its qualities are listed in one column, and the name of the other and its qualities are listed in an adjacent column, it becomes easy for students to see how the things are alike and different and to organize their writing accordingly.
text	a written or spoken piece in its entirety. Text also refers to the body of a piece, excluding headings, titles, etc., or to a textbook used in a school course. In this document, it is used to refer to any piece of literature, fiction or non-fiction.
theme	a topic of discussion or writing; a major idea or proposition broad enough to cover the entire scope of a literary or other work of art. A theme may be stated or implicit, but clues to it may be found in the ideas that are given special prominence or tend to recur in a work.
thesis	the basic argument advanced by a speaker or writer who then attempts to prove it; the subject or major argument of a speech or composition
thesis statement	a sentence that presents the central argument or main idea of a speech or composition
tone	the author's attitude as reflected in his or her writing style in a particular piece. Tone may be sarcastic, humorous, serious, playful, for example.
topic	a general category or class of ideas, often stated in a word or phrase, to which the ideas of a passage belong
topic sentence	a sentence that expresses the main idea in a paragraph or passage
usage	the usual, generally accepted way in which words and phrases are used within a given language community
Venn diagram	a graph or simple picture that uses overlapping circles to show relationships. Words, qualities, etc. may be placed inside separate circles or in the area(s) where circles overlap, showing what they do or do not have in common.
voice	a syntactic pattern that indicates the verb-subject relationship. The principal voices in English and many other languages are active (as in <i>He hit the ball.</i>) and passive (as in <i>The ball was hit.</i>). Also, an author's distinctive way of using language, tone, and other qualities.
word family	a group of words sharing the same root word or a common phonic element. <i>Television</i> , <i>telephone</i> , and <i>telepathy</i> are part of the <i>tele_</i> family. <i>Cat</i> , <i>hat</i> , and <i>mat</i> are part of the <i>_at</i> word family.
word recognition	the process of determining the pronunciation and some degree of meaning in a written word; the quick and easy identification of the form, pronunciation, and appropriate meaning of a word previously encountered in print or writing

RESOURCES—READING & WRITING

PUBLICATIONS

(These publications were distributed to schools or are available from the Alaska Department of Education & Early Development.)

Alaska Department of Education & Early Development Reading Booklets:

1. *On the Threshold: How Your Child Develops Birth to Five Years*
2. *Opening the Door: What Families and Teachers Can Do to Help Every Child Become a Reader*
3. *Unlocking the Door: Current Research on How Children Learn to Read*

Alaska Department of Education & Early Development: *Language Arts Frameworks*. (This document is not current, but many of the classroom suggestions and resources are still quite useful and timely. It is also available on the EED web site at: <http://www.eed.state.ak.us/tls/frameworks/langarts/1title.htm>)

Building a Knowledge Base in Reading. Jane Braunger and Jan Lewis, Northwest Regional Educational Laboratory: Portland, Oregon (1997).

Guidelines for Teaching Middle and High School Students to Read and Write Well: Six Features of Effective Instruction. Judith A. Langer, National Research Center on English Learning and Achievement: Albany, New York (2000).

Title I Resource Guide: A collection of essential school improvement resources. The Comprehensive Centers Network and The National Association of State Title I Directors.

WEB SITES

Alaska Department of Education and Early Development
<http://www.eed.state.ak.us>

International Reading Association
<http://www.reading.org>

National Council of Teachers of English
<http://www.ncte.org>

Alaska Native Curriculum and Teacher Development Project
<http://www.alaskool.org>

Alaska Native Knowledge Network
<http://www.ankn.uaf.edu>

Alaska State Literacy Association
<http://www.asd.k12.ak.us/depts/reading/index.htm>

Alaska State Writing Consortium
<http://pec.jun.alaska.edu/aswcpage.html>

LitSite Alaska
<http://litsite.alaska.edu>

Northwest Regional Educational Laboratory: 6 + 1 Traits Writing Page
<http://www.nwrel.org/eval/writing/>

Northwest Regional Educational Laboratory: Traits of an Effective Reader
<http://www.nwrel.org/eval/reading/>

**WestEd Regional Educational Laboratory:
Strategic Literacy Initiative for Middle and Secondary Students**
<http://www.WestEd.org/stratlit/ideas/ideas.shtml>

**Proofreading Symbols and Terminology—
Capital Community College**
<http://webster.commnet.edu/writing/symbols.htm>

**Guide to Grammar & Writing—
Capital Community College**
<http://ccc.commnet.edu/grammar/index2.stm>

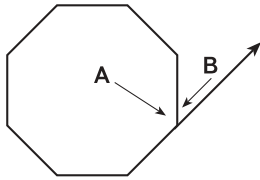
**Social Studies Teacher Resources—
University of Virginia, Curry School of Education**
<http://curry.edschool.virginia.edu/teacherlink/social/resources>

GLOSSARY—MATHEMATICS

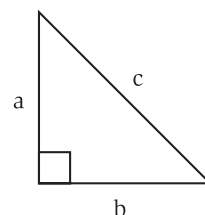
absolute value	the number of units a number is from zero on a number line
abstract context	a problem or statement without reference to a real-world application
accuracy	exactness; correctness
acute angle	an angle whose measure is between 0 degrees and 90 degrees
algebraic expression	a collection of variables (letters) and constants (numerals) that are combined using addition, subtraction, multiplication, division, and radicals or fractional exponents
algebraically	designating an expression, equation, or function in which numbers, letters, and arithmetic operations are contained or used
algorithm	a systematic procedure which, if followed, accomplishes a particular task
associative	An operation (*) is said to be associative if it does not matter where parentheses are placed when three elements are combined. For example, $(a * b) * c = a * (b * c)$ is true if * is associative.
attribute	a distinctive feature or characteristic
base system	a place value system in which the base is a number that is raised to various powers to generate the principal counting units of the number system. For example, 123 in base 10 is $1 \times 10^2 + 2 \times 10^1 + 3 \times 10^0$. 123 in base 5 is $1 \times 5^2 + 2 \times 5^1 + 3 \times 5^0$.
basic operations	the operations of addition, subtraction, multiplication and division
bisector	something that divides a thing into two equal parts
box and whisker plots	graphs that show how far apart and how evenly data are distributed. For example: <div data-bbox="609 1012 1258 1192" data-label="Figure"> <p>The figure is a box and whisker plot on a horizontal number line ranging from 14 to 30 with tick marks every 1 unit. The plot consists of a central box with a vertical line inside, and two horizontal lines (whiskers) extending to the left and right. Arrows point from labels to specific parts of the plot: 'lower extreme' points to the left whisker at 15; 'lower quartile' points to the left edge of the box at 19; 'median' points to the vertical line inside the box at 22; 'upper quartile' points to the right edge of the box at 25; and 'upper extreme' points to the right whisker at 29.</p> </div>
cardinal number	a number, such as 3 or 11 or 412, used to indicate quantity but not order
chart	a presentation of information in the form of graphs or tables
chord	a line segment joining two points on a circle
commutative	The operation * on a set is commutative if $a * b = b * a$ for all members of a set
compass directions	geographical directions in reference to the earth, such as north, south, east, west
compatible numbers	pairs of numbers that work in combination with other numbers (for example, 219 divided by 69 is about 21 divided by 7)
composite number	a whole number, greater than 0, that has more than two whole number factors
concrete representation	a representation or statement presented in the context of a real world application (for example, a number sentence from a word problem)
congruent	having the same shape and size
conservation of area	keeping the area measure of a shape the same even though the shape changes dimensions
coordinate geometry	geometry in which conclusions are drawn based on information about figures located on a coordinate plane
coordinate plane	the plane formed by two perpendicular number lines called <i>axes</i>

coordinates	numbers in an <i>ordered pair</i> ; that is, a pair of numbers that describes a point on a graph with reference to the x (horizontal) and y (vertical) axes
counterexamples	examples that prove a statement to be untrue
curve fitting	finding the equation of a curve that best describes a given set of points
deductive reasoning	the process of demonstrating that if certain statements (axioms, postulates, theorems) are accepted as true then other statements can be proved to follow from them. A good rule of thumb when thinking of deductive reasoning is to view it as applying <i>general</i> cases to prove a <i>specific</i> case.
degree of accuracy	a pre-specified level of exactness or correctness
direct proof	proof that a statement is true by the use of deductive reasoning
distributive	having the property that multiplying a sum by a number gives the same result as multiplying each addend by the number and then adding the products. For example: $a(b + c) = a \times b + a \times c \quad 3(4 + 5) = 3 \times 4 + 3 \times 5$ $3(a + b) = 3a + 3b$
divisibility	capability of being divided with no remainder (for example, the number 21 is divisible by 7)
dodecahedron	a solid shape with twelve faces. All the faces of a regular dodecahedron are regular pentagons.
equation	a mathematical sentence that uses an equals sign (=) to show that two quantities are equal
equivalent fractions	fractions that name the same number, such as $\frac{2}{4}$ and $\frac{1}{2}$
equivalent representations	equal numbers or expressions that are represented in different forms such as fractions, decimals, percents, scientific notation and exponents (for example: $\frac{1}{2} = .5 = 50\%$)
error	the difference between an estimated solution and the exact solution
Euclidean geometry	geometry in which conclusions are drawn based on the propositions given by the Greek geometer Euclid around 250 B.C.
even numbers	numbers ending in 0 or 2 or 4 or 6 or 8; that is, numbers that are multiples of 2
experimental probability	the probability associated with the outcome of an actual experiment; the ratio of the number of times an event occurs in an experiment to the total number of outcomes
exponent	the number that indicates how many times the base is used as a factor. For example, in the equation $2^3 = 2 \times 2 \times 2 = 8$, the exponent is 3, indicating that 2 is used as a factor three times
exponential	containing, describing, or involving an exponent
expression	a mathematical phrase that uses numbers, variables, and operation symbols to represent a value
exterior angle	an angle that forms a linear pair with an interior angle of a polygon. For example, in the diagram below, angle B is an exterior angle <div data-bbox="492 1646 764 1833" data-label="Image"> </div>
factors	numbers that divide exactly into another number; any of two or more whole numbers that are multiplied to form a product (for example, 1, 2, 4, and 8 are factors of 8)

Fibonacci Numbers	numbers in the following sequence: 1, 1, 2, 3, 5, 8, 13, 21, . . . After the first two 1's, each number is the sum of the two immediately preceding it.
finite graphs	graphs on the coordinate plane having an upper and a lower boundary
formula	a rule that is expressed using variables, symbols and/or numbers (for example, $A = \pi r^2$ or $P = 2(L + W)$)
Four (or basic) Operations	the mathematical operations of addition, subtraction, multiplication, and division
frequency distribution	a set of intervals or increments, usually adjacent and of equal width, into which the range of a statistical distribution is divided; a table that pairs each item in a set of data with the number of times that item occurs
front-end estimation	a close calculation that involves rounding numbers to their highest place to arrive at an approximate value
function	a relationship between two quantities in which the value of one quantity is uniquely determined by the value of the other quantity. Each element in the domain (<i>input</i>) is matched with exactly one element of the range (<i>output</i>).
geometric figure	a shape having geometric properties such as length, width, area, etc.
geometric model	a representation of a real-world situation using geometric shapes
geometric sequence	an ordered list of numbers that has a common ratio between successive terms. Each successive term is formed by multiplying the preceding term by the common ratio (for example, 1, 3, 9, 27, . . . is a geometric sequence with a common ratio of 3)
geometric shapes	plane or solid figures having geometric properties
graphic representations	charts, diagrams, tables, graphs, or other pictorial representations of mathematical ideas
graphically	using a graphic representation to illustrate a mathematics problem
guess and check	a problem-solving strategy in which a guess is offered and then checked for accuracy
histogram	a representation of a frequency distribution by means of contiguous bars whose width represents equal intervals and whose height represents the frequency of data values (a bar graph, for example)
identity	the property by which adding 0 to any number results in a sum identical to the given number; and the property by which multiplying 1 by any number results in a product identical to the given number
independent events	events in which the outcome of one event is not affected by the outcome of another event. These are opposed to <i>dependent events</i> , in which the outcome of one event <i>is</i> affected by the outcome of another event. For example, drawing a card from a deck of cards and replacing it, then drawing a second card, are independent events. Drawing a card and not replacing it, and then drawing a second card, are dependent events.
indirect measurements	measurements determined by methods other than the use of measurement tools (for example, calculating a distance using the Pythagorean Theorem, similar figures, or trig ratios)
indirect proof	proof by contradiction
inductive reasoning	the process of observing data, recognizing patterns, and making generalizations from the observations. A good rule of thumb for remembering the process of induction is that one moves from <i>specific</i> cases to a <i>general</i> rule.
inequality	one quality not being equal to another. A mathematical sentence that shows the relationship between quantities that are not equal may use symbols such as $<$, $>$, $<=$, $>=$, \neq .

interior angle	an angle formed within a polygon by the intersection of two sides. For example, in the diagram below, angle A is an interior angle.
	
irregular polygon	a multi-sided closed figure whose sides and angles are not congruent
iteration	the process of repeating the same procedure over and over again
line of symmetry	a line that divides a figure into two congruent parts
linear	relating to a function that has a constant rate of change and can be modeled by a straight line
linear equation	an equation whose graph is a line. Examples: $y = x + 9$, $3 \times 2y = 10$, $y = -4$ Counterexamples: $y = 3x^2 + 6$, $4xy = 12$, $1/y = 4x$
manipulatives	any of a wide variety of physical materials and objects that students may use to foster the learning of abstract ideas in math
mathematical problem-solving strategies	strategies used to solve problems (for example, drawing a picture, “guess and check,” looking for a pattern, making an organized list, making a table or chart, solving a simpler problem, working backward, using manipulatives, acting it out)
matrix	a rectangular array of numbers (plural is <i>matrices</i>). Potential uses include spreadsheets, transformations, linear algebra.
mean	the arithmetic mean, or average; the sum of a set of n numbers divided by n
measure of center	(in statistics) a single score that can best represent a whole set of data (for example, the mean, mode, or median of a data set)
measuring tools	tools used to measure length, capacity, weight, mass, degree, etc.
median	the value of the middle number in an ordered set of data, or the average of the two middle numbers in a set
Metric System	a system of measure whose basic units are: meter for length, liter for capacity, gram for mass, and degrees Celsius for temperature
mode	the “most popular” value, or the most frequently occurring item in a set of data
model	a representation of something in the real world that uses geometry, algebra, or other mathematics
multiple	the product of a number and a whole number (for example, multiples of 8 are 8, 16, 24, 32...)
non-standard units	measuring units that are not Metric or U.S. Customary System measuring units
number sequence	an ordered list of numbers
number system	a group of interacting, interrelated, or interdependent elements grouped together for classification or analysis. For example, the base 10 system.
number theory	the study of characteristics of numbers such as primes, composites, factors, multiples, etc.
numeric	expressed or counted by numbers
numerical representation	an expression that includes only numbers

obtuse angle	an angle whose measure is between 90 degrees and 180 degrees
odd numbers	numbers not divisible by 2. Odd numbers have 1, 3, 5, 7, or 9 in the ones' place
one-to one correspondence	the situation in which two sets of elements match, and each element from one set is paired with one and only one element from the other set
open sentence	a mathematical sentence in which at least one term is unknown (for example, $3 + \underline{\hspace{1cm}} = 5$, or $3 + a = 5$). An open sentence is neither true nor false.
operation	a way of combining elements in a set (for example, addition, subtraction, multiplication, division)
order	the arrangement of numbers in a sequence, such as smaller to larger, or larger to smaller
order of operations	the correct order of evaluating numerical expressions. First, do work in parentheses or brackets. Second, evaluate powers and roots. Third, do multiplication and division from left to right. Last, add and subtract from left to right.
ordered pair	a pair of numbers used to locate a point on the coordinate plane. The first number represents the position with reference to the x -axis (horizontal). The second number represents the position with reference to the y -axis (vertical).
ordinal numbers	numbers indicating position in a series or order. The ordinal numbers are <i>first</i> , <i>second</i> , <i>third</i> , etc.
Pascal's Triangle	a system of numbers triangularly arranged in rows that consist of the coefficients in the expansion of $(a + b)^n$ for $n = 0, 1, 2, 3, \dots$
pattern	the arrangement of numbers, pictures, etc. in an organized and predictable way
percent	a ratio whose second term is 100 (for example, 20:100, $20/100 = 20$ percent, or 20%)
perfect square	a number whose square root is a whole number
perpendicular	intersecting to form a right angle
pictograph	a graph that uses pictures to show and compare information
pictorial representation	a drawing or picture that represents data
place value	the value of a digit in a number, written in standard notation, as determined by its position. In a base 10 system, each place has a value ten times that of the place to its right and one-tenth the value of the place to its left.
plane figure	a figure whose points all lie on the same plane
polygon	A closed plane figure whose sides consist of three or more segments in the same plane that intersect only at their endpoints
polynomials	algebraic expressions with more than one term
power	the number of times that a number is used as a factor (for example, 2 to the power 5 is $2 \times 2 \times 2 \times 2 \times 2$ and is written 2^5)
precision	a property of measurement that is related to the unit of measure used. The smaller the unit of measure, the more <i>precise</i> the measurement is (for example, 27mm is more precise than 3 cm).
prime number	a number that has exactly two factors, itself and 1
proportion	an equation stating that two ratios are equal
Pythagorean Theorem	the proposition that for every right triangle, the sum of the areas of the squares on the legs equals the area of the square on the hypotenuse. In the diagram to the right, if a and b are the lengths of the legs, and c is the length of the hypotenuse, then $a^2 + b^2 = c^2$.



quadratic	a function or equation involving a variable raised to the second power, and no higher power. The general form of a quadratic equation is: $ax^2 + bx + c = 0$, where a , b , and c are real numbers and a is not equal to 0.
range	(in statistics) the difference between the greatest and the least numbers in a set of data
ratio	a comparison of two numbers or quantities (for example, 5 to 7, 5:7, or 5/7)
rational expression	a polynomial or a quotient of polynomials
rational number	any number that can be expressed as a ratio a/b when a and b are integers and $b \neq 0$.
ray	a part of a line that has one endpoint and extends endlessly in the other direction
real numbers	the set of numbers that includes all rational and irrational numbers
rectangular prism	a solid figure with parallel, congruent rectangular bases, and parallelograms as sides
regular polygon	a polygon that has all its sides the same length and all its angles the same size
relationship	a way of connecting sets of things, such as numbers or people
right angle	an angle with a measure of 90 degrees
right triangle trigonometry	the study of the relationship between angle measures and ratios of side lengths of right triangles. The common ratios are sine, cosine and tangent.
root	a number that when multiplied by itself an indicated number of times forms a product equal to a specified number. Also a solution to an equation. For example, a is the x th root of b if $a^x = b$.
rounding	the process of dropping digits to the right of the decimal point or removing non-zero digits to the left of the decimal point and replacing them with zeros
sample group	(in statistics) a representative portion of the population(s) from which information is gathered
sample space	a set of all the possible outcomes of an experiment
scale	a ratio that compares the dimensions of a model to the actual dimensions of an object
scale drawing	a drawing made so that all distances in the drawing are proportional to actual distances
scatter plot	a graph made by plotting points on a coordinate plane to show the relationship between two variables in a data set
scientific notation	the method of expressing a number as the product of a number from 1 up to, but not including, 10, and a power of 10 (for example, $483 = 4.83 \times 10^2$)
secant	a line that intersects a circle at two points
sequence	an ordered list of numbers
sets of equations	See <i>systems of equations</i>
similar	having the same shape but not necessarily the same size
skip count	to count by multiples (for example, 3, 6, 9, 12, ...)
slope of a line	the measure of the steepness of a line; that is, the ratio of vertical change to horizontal change
solid figure	a three dimensional figure such as a sphere, a cube, or a pyramid, etc.)
Standard System	(also known as the U.S. Customary System or U.S. System of measurement) a system that measures length in inches, feet, yards, and miles; capacity in cups, pints, quarts, and gallons; weight in ounces, pounds, and tons; and temperature in degrees Fahrenheit

standard units	U.S. Customary and/or Metric units of measure										
stem and leaf plot	<p>a method of organizing data from least to greatest using the digits of the greatest place value to group data</p> <p>Example:</p> <table> <tr> <th colspan="2">Number of Sit-Ups</th></tr> <tr> <th>Stem</th><th>Leaves</th></tr> <tr> <td>3</td><td>4 6 8 8</td></tr> <tr> <td>4</td><td>0 3 6 7 7</td></tr> <tr> <td>5</td><td>0 0 1 2</td></tr> </table> <p>Each tens digit is called the stem. →</p> <p>← The ones digits are called the leaves.</p>	Number of Sit-Ups		Stem	Leaves	3	4 6 8 8	4	0 3 6 7 7	5	0 0 1 2
Number of Sit-Ups											
Stem	Leaves										
3	4 6 8 8										
4	0 3 6 7 7										
5	0 0 1 2										
subset	If every element of a set B is also an element of the set A, then B is a subset of A.										
survey	(in statistics) a study that collects data from human respondents. Surveys are used to find out about people's characteristics, behaviors, interests, etc.										
symbolic	of, pertaining to, or expressed by a symbol or symbols										
symmetrical	having a line of symmetry, or correspondence in size, shape, and relative position										
system of equations	two or more linear equations used to determine a common solution										
systems (of measurement)	Metric Measure and U.S. Customary Measure										
table	an organized display of data using columns and rows to delineate categories of data										
tally	a mark used to record a number of acts or objects, most often in a series of five, consisting of four vertical lines crossed diagonally or horizontally by a fifth line										
tangent	a line intersecting a circle at only one point and perpendicular to the radius at that point										
tessellations	repeating patterns of congruent plane figures that completely cover a plane with no gaps or overlapping (like a mosaic)										
tetrahedron	a polyhedron with four triangular faces										
theoretical probability	the ratio of the number of times an event could occur to total possible outcomes										
transformation	a change in the size, shape, or position of a geometric figure (for example, a translation or slide, a reflection or flip, a rotation or turn, a dilation or enlargement or reduction)										
tree diagram	a branching diagram that shows all possible outcomes of an experiment										
triangular prism	a solid figure that has two parallel congruent triangular bases and parallelograms as sides										
truncating	cutting a number off abruptly rather than rounding it										
unit of measure	a precise quantity used to describe an attribute of an object. For example, inches, cm, feet, etc. are units of measure used to describe length. Quarts, gallons, liters are units of measure used to describe capacity.										
validity	the state in which a conclusion is correctly derived from premises										
variable	a letter or symbol used to represent one or more numbers in an expression, equation or inequality										
Venn diagram	a graph or picture that uses circles to show relationships between sets by inclusion, exclusion, or intersection of the circles										
vertex	a point where two or more rays or segments meet, where sides of a polygon meet, or where edges of a polyhedron meet (plural is <i>vertices</i>)										
whole numbers	the set whose numbers are zero and the counting numbers (for example, the numbers 0, 1, 2, 3 and so on)										

RESOURCES—MATHEMATICS

PUBLICATIONS

National Council of Teachers of Mathematics (NCTM) Curriculum and Evaluation Standards, 1989.

NCTM Addenda Series 1992.

(Available by strand for grades K-12 and by grade level for grades K-6)

NCTM Principles and Standards for School Mathematics, 2000.

NCTM Navigations Series, 2001.

NCTM magazines/bulletins: Teaching Children Mathematics, Mathematics Teaching in the Middle School, Mathematics Teacher, Dialogues, News Bulletin, Student Math Notes.

Books by Marilyn Burns

Books and videos by Bill Nye

Adding It Up: Helping Children Learn Mathematics, National Academy Press, Washington, D.C., 2001.

WEB SITES

<http://www.eed.state.ak.us/tls/mathconsortium/home.html/>

(Alaska Math Consortium)

<http://www.nctm.org/> (National Council of Teachers of Mathematics)

<http://www.illuminations.nctm.org>

<http://www.standards.nctm.org>

<http://forum.swarthmore.edu/> (Math Forum)

<http://www.lhs.berkeley.edu/> (Lawrence Hall of Science)

CATALOGS

Creative Publications

Dale Seymour Publications

Activity Resources Company



APPENDIX 1

Alaska Content and Performance Standards in Reading, Writing, and Mathematics

ALASKA CONTENT STANDARDS for English/Language Arts

The **CONTENT STANDARDS FOR ALASKA STUDENTS** were adopted by the Alaska State Board of Education in 1994 and 1995. The **ALASKA READING PERFORMANCE STANDARDS** support the sections of the English/Language Arts Content Standards listed to the right of this column. The Benchmark Examinations and the High School Qualifying Examination will assess students' competencies on the performance standards.

These are the English/Language Arts content standards that relate to reading.

B. A student should be a competent and thoughtful reader, listener, and viewer of literature, technical materials, and a variety of other information. A student who meets the content standard should:

1. comprehend meaning from written text and oral and visual information by applying a variety of reading, listening, and viewing strategies; these strategies include phonic, context, and vocabulary cues in reading, critical viewing, and active listening;
2. reflect on, analyze, and evaluate a variety of oral, written, and visual information and experiences, including discussions, lectures, art, movies, television, technical materials, and literature; and,
3. relate what the student views, reads, and hears to practical purposes in the student's own life, to the world outside, and to other texts and experiences.

D. A student should be able to think logically and reflectively in order to present and explain positions based on relevant and reliable information. A student who meets the content standard should:

1. develop a position by
 - a. reflecting on personal experience, prior knowledge, and new information,
 - b. formulating and refining questions,
 - c. identifying a variety of pertinent sources of information,
 - d. analyzing and synthesizing information, and
 - e. determining an author's purposes.
2. evaluate the validity, objectivity, reliability, and quality of information read, heard, and seen.

E. A student should understand and respect the perspectives of others in order to communicate effectively. A student who meets the content standard should:

1. use information, both oral and written, and literature of many types and cultures to understand self and others;
2. recognize content from the speaker's or author's perspective;
3. recognize bias in all forms of communication; and
4. recognize the communication styles of different cultures and the possible effects on others.

ALASKA READING PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
<p>R1.1a Distinguish, reproduce, and manipulate the sounds in words.</p> <p>R1.1b Use a combination of the following to read and comprehend text:</p> <ul style="list-style-type: none"> • knowledge of phonics, alphabet, and alphabetic principle, <i>e.g.</i> recognition of letter shapes, letter names, letter/sound relationships, initial/final consonants, vowels, letter patterns; • pictures and visual cues; • sight recognition of high frequency vocabulary words; • word structure, <i>e.g.</i> root words, prefixes, suffixes, rhyming words; • language structure, <i>e.g.</i>, word order, grammar; • meaning structure, <i>e.g.</i>, prior knowledge and context; • text structure <i>e.g.</i>, read left to right. 	<p>R2.1a Use a combination of the following to read and comprehend text:</p> <ul style="list-style-type: none"> • knowledge of phonetics, language structure, and semantics; • text structures such as illustrations, graphs, and headers; • self-monitoring and self-correcting strategies when reading; • adjusting reading pace or style based on purpose, task, and type of text. <p>R2.1b Use knowledge of word families, phonetics, context clues, visual cues, and structural elements to determine meaning of unfamiliar words.</p>	<p>R3.1 Apply knowledge of word origins, structure and context clues, and root words, and use dictionaries and glossaries, to determine the meaning of new words and to comprehend text.</p>	<p>R4.1 Apply knowledge of syntax, roots, and word origins, and use context clues and reference materials, to determine the meaning of new words and to comprehend text.</p>
<p>R1.2a Comprehend literal meaning from text.</p> <p>R1.2b Use a variety of strategies to support comprehension, including predicting, questioning, rereading, and monitoring own comprehension.</p>	<p>R2.2 Infer meaning from text.</p>	<p>R3.2 <i>This standard is assessed at an earlier level. It is related to R4.10 (understanding of theme).</i></p>	<p>R4.2 <i>This standard is assessed at an earlier level. It is related to R4.10 (understanding of theme).</i></p>
<p>R1.3 Read texts aloud with expression, demonstrating knowledge of punctuation and other conventions of print.</p>	<p>R2.3 Read texts aloud with rhythm, flow, expression, demonstrating knowledge of punctuation and other conventions of print.</p>	<p>R3.3 Rehearse and read texts aloud to an audience, in performances such as readers' theater, reading to younger students or peers, or as part of formal presentations including research reports and literature responses.</p>	<p>R4.3 <i>Students are expected to master skills related to this standard in earlier grades.</i></p>
<p>R1.4a Retell or dramatize a story after reading it.</p> <p>R1.4b Restate information after reading a text.</p>	<p>R2.4a Retell stories in correct sequence.</p> <p>R2.4b Restate and summarize information or ideas from a text.</p>	<p>R3.4 Restate and summarize information or ideas from a text and connect new information or ideas to prior knowledge and experience.</p>	<p>R4.4 Summarize information or ideas from a text and make connections between summarized information or sets of ideas and related topics or information.</p>
<p>R1.5 Identify the main idea of a passage.</p>	<p>R2.5 Locate evidence in the text and from related experiences to support understanding of a main idea.</p>	<p>R3.5 Clarify and connect main ideas and concepts, identify their relationship to other sources and related topics, and provide supporting details.</p>	<p>R4.5a Identify and assess the validity, accuracy, and adequacy of evidence that supports an author's main ideas.</p> <p>R4.5b Critique the power, logic, reasonableness, and audience appeal of arguments advanced in public documents.</p>

ALASKA READING PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
R1.6 Read and follow simple directions to complete a simple task.	R2.6 Read and follow multi-step directions to complete a simple task.	R3.6 Read and follow multi-step directions to complete a task, and identify the sequence prescribed.	R4.6 Read and follow multi-step directions to complete complex tasks.
R1.7 Distinguish between common forms of text (genres): <ul style="list-style-type: none"> • fiction and non-fiction, • prose and poetry, and • short story and drama. 	R2.7 Explain the characteristics of the following: <ul style="list-style-type: none"> • fiction and non-fiction, • prose and poetry, and • four major genres of fiction: short story, drama, novel, and poetry. 	R3.7 Analyze basic rules (conventions) of the four genres of fiction (short story, drama, novel and poetry).	R4.7 Analyze the rules (conventions) of the four genres of fiction (short story, drama, novel, and poetry) and the techniques used in these genres, and evaluate the effects of these conventions and techniques on the audience.
R1.8 Identify and describe basic plot, main characters, and setting (time and place) in fiction.	R2.8a Define and identify plots, settings, and characters in fiction. R2.8b Compare and contrast plots, settings, and characters in a variety of works by a variety of authors.	R3.8 Analyze and evaluate narrative elements including plot, character, setting and point of view to determine their importance to the story.	R4.8 Analyze and evaluate how authors use narrative elements and tone in fiction for specific purposes.
R1.9 Express own opinions about texts.	R2.9a Differentiate between fact and opinion. R2.9b Express opinions about a text and support these opinions with textual evidence.	R3.9a Differentiate between fact and opinion in text. R3.9b Analyze an author's purpose and offer a critical opinion of the effectiveness of the text in meeting that purpose.	R4.9 Express and support assertions, with evidence from the text or experience, about the effectiveness of a text.
R1.10 Make connections between a text and personal experiences, experiences of others, or other texts, and locate details in the text to illustrate these connections.	R2.10 Identify themes in texts and connect them to personal experiences, experiences of others, and other texts.	R3.10 Connect themes to personal experiences, experiences of others, and other texts, and locate evidence from texts to support or illustrate these connections.	R4.10 Analyze and evaluate themes across a variety of texts, using textual and experiential evidence.
R1.11 Identify basic cultural influences in texts.	R2.11 Connect cultural events, ideas, settings, and influences from one text to similar texts from other cultures.	R3.11 Compare and contrast how texts reflect historical and cultural influences.	R4.11 Analyze the effects of cultural and historical influences on texts.

ALASKA CONTENT STANDARDS for English/Language Arts

The **CONTENT STANDARDS FOR ALASKA STUDENTS** were adopted by the Alaska State Board of Education in 1994 and 1995. The **ALASKA WRITING PERFORMANCE STANDARDS** support the sections of the English/Language Arts Content Standards listed to the right of this column. The Benchmark Examinations and the High School Qualifying Examination will assess students' competencies on the performance standards.

These are the English/Language Arts content standards that relate to writing.

A. A student should be able to speak and write well for a variety of purposes and audiences. A student who meets the content standard should:

1. apply elements of effective writing and speaking; these elements include ideas, organization, vocabulary, sentence structure, and personal style;
2. in writing demonstrate skills in sentence and paragraph structure, including grammar, spelling, capitalization, and punctuation;
4. write and speak well to inform, to describe, to entertain, to persuade, and to clarify thinking in a variety of formats, including technical communication;
5. revise, edit, and publish the student's own writing as appropriate; and
8. evaluate the student's own speaking and writing and that of others using high standards.

D. A student should be able to think logically and reflectively in order to present and explain positions based on relevant and reliable information. A student who meets the content standard should:

1. develop a position by
 - a. reflecting on personal experiences, prior knowledge, and new information;
 - b. formulating and refining questions;
 - c. identifying a variety of pertinent sources of information;
 - d. analyzing and synthesizing information;
 - e. determining an author's purpose; and
2. evaluate the validity, objectivity, reliability, and quality of information read, heard, and seen;
3. give credit and cite references as appropriate; and
4. explain and defend a position orally, in writing, and with visual aids as appropriate.

ALASKA WRITING PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
<p>W1.1a Write complete sentences with a subject and a predicate.</p> <p>W1.1b Write a paragraph with a topic sentence and supporting details.</p> <p>W1.1c Write short stories or compositions with a beginning, middle, and end.</p>	<p>W2.1 Write a well-organized two-paragraph composition that addresses a single topic.</p>	<p>W3.1 Write a coherent composition that includes a thesis statement, supporting evidence, and a conclusion.</p>	<p>W4.1 Write a coherent composition with a thesis statement that is supported with evidence, well-developed paragraphs, transitions, and a conclusion.</p>
<p>W1.2 Write for a specific audience, including self, other children, parents, and other adults.</p>	<p>W2.2 Use a variety of fiction and non-fiction forms when writing for different audiences.</p>	<p>W3.2 Select and use appropriate forms of fiction and non-fiction to achieve different purposes when writing for different audiences.</p>	<p>W4.2 Demonstrate understanding of elements of discourse (purpose, speaker, audience, form) when completing expressive (creative, narrative, descriptive), persuasive, research-based, informational, or analytic writing assignments.</p>
<p>W1.3a Use a variety of simple sentence structures, and basic rules of punctuation and capitalization in written work.</p> <p>W1.3b Proofread writing for legibility, spelling, capitalization, and punctuation when producing final drafts.</p>	<p>W2.3a Use a variety of simple and complex sentence structures in written work.</p> <p>W2.3b Proofread and correct grammar, sentence structure, paragraph structure, punctuation, capitalization, spelling, and usage in finished written work.</p>	<p>W3.3 Use the conventions of standard English including grammar, sentence structure, paragraph structure, punctuation, spelling, and usage in written work.</p>	<p>W4.3 Use the conventions of standard English independently and consistently including grammar, sentence structure, paragraph structure, punctuation, spelling, and usage.</p>
<p>W1.4a Revise writing for detail and clarity.</p> <p>W1.4b Provide appropriate feedback to peers about written work.</p>	<p>W2.4a Revise writing to improve the logical progression of ideas and supporting information.</p> <p>W2.4b Revise own and others' work and provide appropriate feedback to peers based upon established criteria, to improve quality and effectiveness of writing.</p>	<p>W3.4a Revise writing to improve organization, word choice, paragraph development, and voice appropriate to the purpose.</p> <p>W3.4b Form and explain own standards or judgments of quality writing.</p>	<p>W4.4 Revise writing to improve style, word choice, sentence variety, and subtlety of meaning in relation to the purpose and audience.</p>
<p>W1.5 List titles and authors of books and other materials when used as references in written work.</p>	<p>W2.5 Give credit for others' ideas, images, and information by citing information about sources, including title and author.</p>	<p>W3.5 List and document sources using a given format.</p>	<p>W4.5 Cite sources of information using a standard method of documentation.</p>
<p>W1.6 <i>This standard is addressed in the intermediate grades.</i></p>	<p>W2.6 Use resources such as computers, word processing software, dictionaries, and thesauruses to make choices when writing.</p>	<p>W3.6 Compose and edit a composition with a word processing program.</p>	<p>W4.6 <i>This standard is addressed in the intermediate grades, and students are expected to continue to use these skills throughout high school.</i></p>

ALASKA CONTENT STANDARDS for Mathematics

The **CONTENT STANDARDS FOR ALASKA STUDENTS** were adopted by the Alaska State Board of Education in 1994 and 1995. The **ALASKA MATHEMATICS PERFORMANCE STANDARDS** support the Mathematics Content Standards listed to the right of this column. The Benchmark Examinations and the High School Qualifying Examination will assess students' competencies on the performance standards.

A. A student should understand mathematical facts, concepts, principles, and theories. A student who meets the content standard should:

1. understand and use numeration, including
 - a. numbers, number systems, counting numbers, whole numbers, integers, fractions, decimals, and percents; and
 - b. irrationals and complex numbers;
2. select and use appropriate systems, units, and tools of measurement, including estimation;
3. perform basic arithmetic functions, make reasoned estimates, and select and use appropriate methods or tools for computation or estimation including mental arithmetic, paper and pencil, a calculator, and a computer;
4. represent, analyze, and use mathematical patterns, relations, and functions using methods such as tables, equations, and graphs;
5. construct, draw, measure, transform, compare, visualize, classify, and analyze the relationships among geometric figures; and
6. collect, organize, analyze, interpret, represent, and formulate questions about data and make reasonable and useful predictions about the certainty, uncertainty, or impossibility of an event.

B. A student should understand and be able to select and use a variety of problem-solving strategies. A student who meets the content standard should:

1. use computational methods and appropriate technology as problem-solving tools;
2. use problem solving to investigate and understand mathematical content;
3. formulate mathematical problems that arise from everyday situations;
4. develop and apply strategies to solve a variety of problems;
5. check the results against mathematical rules;
6. use common sense to help interpret results;
7. apply what was learned to new situations; and
8. use mathematics with confidence.

C. A student should understand and be able to form and use appropriate methods to define and explain mathematical relationships. A student who meets the content standard should:

1. express and represent mathematical ideas using oral and written presentations, physical materials, pictures, graphs, charts, and algebraic expressions;
2. relate mathematical terms to everyday language;
3. develop, test, and defend mathematical hypotheses; and
4. clarify mathematical ideas through discussion with others.

D. A student should be able to use logic and reason to solve mathematical problems. A student who meets the content standard should:

1. analyze situations;
2. draw logical conclusions;

3. use models, known facts, and relationships to explain the student's reasoning;
4. use deductive reasoning to verify conclusions, judge the validity of arguments, and construct valid arguments; and
5. use inductive reasoning to recognize patterns and form mathematical propositions.

E. A student should be able to apply mathematical concepts and processes to situations within and outside of school. A student who meets the content standard should:

1. explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations;
2. use mathematics in daily life; and
3. use mathematics in other curriculum areas.

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
A1. Numeration			
A1.1.1 Read, write, order, count, and model one-to-one correspondence with whole numbers to 100.	A1.2.1 Read, write, model, order, and count with positive whole numbers to 1,000,000 and negative whole numbers.	A1.3.1 Read, write, model, and order real numbers, explaining scientific notation, exponents, and percents.	A1.4.1 Read, write, model, order, and define real numbers and subsets.
A1.1.2 Use, model, and identify place value positions of 1's, 10's, and 100's.	A1.2.2 Use, model and identify place value positions from 0.001 to 1,000,000.	A1.3.2 Model counting in a different base system.	A1.4.2 Add in a different base system.
A1.1.3 Model and explain the processes of addition and subtraction, describing the relationship between the operations.	A1.2.3 Model and explain the processes of multiplication and division. Describe the relationships among the four basic operations.		A1.4.3 Compare and contrast the relationship between various applications of the same operation.
A1.1.4 Select and use various representations of ordinal and cardinal numbers.	A1.2.4 Identify and describe different uses for the same numerical representation.	A1.3.4 Translate between equivalent representations of the same number. Select a representation that is appropriate for the situation.	A1.4.4 Translate between equivalent representations of the same exponential expression.
A1.1.5 Identify, model, and label simple fractions, describing and defining them as equal parts of a whole, a region, or a set.	A1.2.5 Model and explain the process of adding and subtracting fractions with common denominators and decimals that represent money.	A1.3.5 Describe and model the relationship of fractions to decimals, percents, ratios, and proportions.	
A1.1.6 Identify, describe, and extend patterns inherent in the number system. Skip count by 2's, 5's and 10's. Add and subtract by 10. Identify even and odd numbers.	A1.2.6 Identify and describe factors and multiples including those factors and multiples common to a pair or set of numbers.	A1.3.6 Use, explain, and define the rules of divisibility, prime and composite numbers, multiples, and order of operations.	
A1.1.7 Demonstrate the commutative and identity properties of addition.	A1.2.7 Demonstrate the commutative and identity properties of multiplication.	A1.3.7 Use commutative, identity, associative, and distributive properties with variables.	A1.4.7 Recognize, describe, and use properties of the real number system.

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
A2. Measurement			
A2.1.1 Compare and order objects by various measurable attributes including calendar, temperature, length, weight, capacity, area, and volume.	A2.2.1 Estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems.	A2.3.1 Estimate and measure various dimensions to a specified degree of accuracy.	A2.4.1 Evaluate measurements for accuracy, precision, and error with respect to the measuring tools, methods, and the computational process.
A2.1.2 Compare objects to standard and non-standard units to identify objects that are greater than, less than, and equal to a given unit.	A2.2.2 Identify and use equivalent measurements (<i>e.g.</i> , 60 minutes = 1 hour, 7 days = 1 week).	A2.3.2 Estimate and convert measurements within the same system.	A2.4.2 Estimate and convert measurements between different systems.
	A2.2.3 Use a variety of measuring tools; describe the attribute(s) they measure.	A2.3.3 Use a variety of methods and tools to construct and compare plane figures.	A2.4.3 Apply various measurement systems to describe situations and solve problems.
A2.1.4 Choose a unit of measure, estimate the length or weight of objects and then measure to check for reasonableness.	A2.2.4 Estimate and measure the dimensions of geometric figures.	A2.3.4 Describe and apply the relationships between dimensions of geometric figures to solve problems using indirect measurement; describe and apply the concepts of rate and scale.	A2.4.4 Use indirect methods, including the Pythagorean Theorem and right triangle trigonometry, to find missing dimensions.
A2.1.5 Tell time to the nearest half hour, distinguishing between morning, afternoon, and evening.	A2.2.5 Tell time using analog and digital clocks identifying AM and PM; find elapsed time.	A2.3.5 Apply information about time zones and elapsed time to solve problems.	
A2.1.6 Identify coins, their value, and the value of given sets of coins.	A2.2.6 Read, write, and use money notation, determining possible combinations of coins and bills to equal given amounts; count back change for any given situation.		

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
A3. Estimation and Computation			
A3.1.1 Make reasonable estimates of “how many” and “how much”; estimate the results of simple addition and subtraction problems.	A3.2.1 Describe and use a variety of estimation strategies including rounding to the appropriate place value, multiplying by powers of 10 and using front-end estimation to check the reasonableness of solutions.	A3.3.1 Apply, explain, and assess the appropriateness of a variety of estimation strategies including truncating and rounding to compatible numbers.	A3.4.1 Use estimation to solve problems and to check the accuracy of solutions; state whether the estimation is greater or less than the exact answer.
A3.1.2 Recall and use basic addition and subtraction facts orally and with paper and pencil without a calculator.	A3.2.2 Recall and use basic multiplication and division facts orally, with paper and pencil without a calculator.	A3.3.2 Apply basic operations efficiently and accurately, using estimation to check the reasonableness of results.	
A3.1.3 Add and subtract whole numbers to 100 using a variety of models and algorithms.	A3.2.3 Add and subtract whole numbers and fractions with common denominators to 12 and decimals, including money amounts, using models and algorithms.	A3.3.3 Add and subtract fractions, decimals, and percents.	A3.4.3 Add and subtract real numbers using scientific notation, powers, and roots.
A3.1.4 Model multiplication as repeated addition and grouping objects; model division as “sharing equally” and grouping objects.	A3.2.4 Multiply and divide multi-digit whole numbers by 2-digit numbers, limiting the 2-digit divisors to those that end in 0; multiply and divide decimals that represent money by whole numbers.	A3.3.4 Multiply and divide rational numbers in various forms including fractions, decimals, and percents.	A3.4.4 Multiply and divide real numbers in various forms including scientific notation, powers, and roots.
	A3.2.5 Find equivalent fractions. Convert between fractions and mixed numbers.	A3.3.5 Convert between equivalent fractions, decimals, percents, and proportions. Convert from exact to decimal representations of irrational numbers.	A3.4.5 Select, convert, and apply an equivalent representation of a number for a specified situation.
	A3.2.6 Develop and interpret scales and scale models.	A3.3.6 Solve problems using ratios and proportions.	A3.4.6 Use ratios and proportions to model and solve fraction and percent problems with variables.

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
A4. Functions and Relationships			
A4.1.1 Recognize, describe, create, and extend repeating and increasing patterns with a variety of materials including symbols, objects, and manipulatives.	A4.2.1 Use patterns and their extensions to make predictions and solve problems; describe patterns found in the number system including those formed by multiples, factors, perfect squares, and powers of 10.	A4.3.1 Identify numeric and geometric patterns to find the next term and predict the <i>n</i> th term.	A4.4.1 Identify, graph, and describe the graphs of basic families of functions including linear, absolute value, quadratic, and exponential using a graphing calculator.
A4.1.2 Generate and solve simple functions by identifying and applying addition and subtraction patterns.	A4.2.2 Generate and solve simple functions by identifying and applying multiplication and division patterns.	A4.3.2 Identify and describe how a change in one variable in a function effects the remaining variables (e.g., how changing the length effects the area and volume of a rectangular prism).	A4.4.2 Create and solve linear and quadratic equations and inequalities.
A4.1.3 Use a calculator to find and extend patterns in the number system.	A4.2.3 Use a calculator to find a missing item in a number sequence.	A4.3.3 Use a calculator to find a missing item in an arithmetic and a geometric sequence; predict the graph of each function.	A4.4.3 Create and solve simple systems of equations, algebraically and graphically, using a graphing calculator.
	A4.2.4 Use words, lists, and tables to represent and analyze patterns.	A4.3.4 Translate among and use tables of ordered pairs, graphs on coordinate planes, and linear equations as tools to represent and analyze patterns.	A4.4.4 Use discrete structures such as networks, matrices, sequences, and iterations as tools to analyze patterns, expressions, and equations.
A4.1.5 Complete open space sentences with missing numbers; use appropriate vocabulary including <i>greater than</i> , <i>less than</i> , and <i>equal to</i> ; and use the correct symbols.	A4.2.5 Explain the purpose of variables and use them in open sentences to express relationships and describe simple functions.	A4.3.5 Find the value of a variable by evaluating formulas and algebraic expressions for given values.	A4.4.5 Add, subtract, multiply, divide, and simplify rational expressions; add, subtract, and multiply polynomials.

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
A5. Geometry			
A5.1.1 Identify, sort, describe, model, and compare circles, triangles, and rectangles including squares regardless of orientation.	A5.2.1 Identify and compare various triangles and quadrilaterals according to their sides and/or angles.	A5.3.1 Identify, classify, compare, and sketch regular and irregular polygons.	A5.4.1 Identify and use the properties of polygons, including interior and exterior angles, and circles (including angles, arcs, chord, secants, and tangents) to solve problems.
A5.1.2 Identify, sort, describe, model, and compare solid figures including cubes, cylinders, and spheres.	A5.2.2 Compare and contrast plane and solid figures (e.g., circle/sphere, square/cube, triangle/pyramid) using relevant attributes, including the number of vertices, edges, and the number and shape of faces.	A5.3.2 Model, identify, draw and describe 3-dimensional figures including tetrahedrons, dodecahedrons, triangular prisms, and rectangular prisms.	A5.4.2 Create 2-dimensional representations of 3-dimensional objects.
A5.1.3 Identify and create examples of line symmetry; compare and describe given circles, triangles, and rectangles as larger, smaller, or congruent.	A5.2.3 Identify and model geometric figures that are congruent, similar, and/or symmetrical.	A5.3.3 Apply the properties of equality and proportionality to solve problems involving congruent or similar shapes.	A5.4.3 Identify congruent and similar figures using Euclidean and coordinate geometries; apply this information to solve problems.
A5.1.4 Demonstrate conservation of area using drawings or manipulatives.	A5.2.4 Distinguish between area and perimeter; find both using a variety of methods including rulers, grid paper and tiles.	A5.3.4 Estimate and determine volume and surface areas of solid figures using manipulatives and formulas; estimate and find circumferences and areas of circles.	
A5.1.5 Describe and identify geometric transformations including slides, flips, and turns.	A5.2.5 Identify and model transformations of geometric figures, describing the motions as slides, flips, or rotations.	A5.3.5 Draw and describe the results of transformations including translations (slides), rotations (turns), reflections (flips), and dilations (shrinking or enlarging).	A5.4.5 Use transformations to demonstrate geometric properties.
A5.1.6 Use comparative directional and positional words: <i>above, below, inside, outside, on, in, right and left, horizontal, vertical, and middle.</i>	A5.2.6 Locate and describe objects in terms of their position with and without compass directions; identify coordinates for a given point or locate points of given coordinates on a grid.	A5.3.6 Use coordinate geometry to represent and interpret relationships defined by equations and formulas including distance and midpoint.	A5.4.6 Use coordinate geometry to graph linear equations, determine slopes of lines, identify parallel and perpendicular lines, and find possible solutions to sets of equations.
A5.1.7 Draw and build familiar shapes.	A5.2.7 Sketch and identify line segments, midpoints, intersections, parallel and perpendicular lines.	A5.3.7 Draw, measure, and construct geometric figures including perpendicular bisectors, polygons with given dimensions and angles, circles with given dimensions, perpendicular and parallel lines.	A5.4.7 Construct geometric models, transformations, and scale drawings using a variety of methods including paper folding, compass, straight edge, protractor, and technology.

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
A.6 Statistics and Probability			
A6.1.1 Collect, record, organize, display, and explain the classification of data.	A6.2.1 Collect, organize, and display data creating a variety of visual displays including tables, charts, and line graphs.	A6.3.1 Collect, analyze and display data in a variety of visual displays including frequency distributions, circle graphs, box and whisker plots, stem and leaf plots, histograms, and scatter plots with and without technology.	A6.4.1 Analyze and draw inferences from a wide variety of data sources that summarize data; construct graphical displays with and without technology.
A6.1.2 Describe data from a variety of visual displays including tallies, tables, pictographs, bar graphs, and Venn diagrams.	A6.2.2 Present the data using a variety of appropriate representations and explain the meaning of the data.	A6.3.2 Interpret and analyze information found in newspapers, magazines, and graphical displays.	A6.4.2 Determine the line of best fit and use it to predict unknown data values.
A6.1.3 Use the terms <i>maximum</i> and <i>minimum</i> when working with a data set.	A6.2.3 Describe and interpret a data set using mean, median, mode, and range.	A6.3.3 Determine and justify a choice of mean, median, or mode as the best representation of data for a practical situation.	A6.4.3 Describe data, selecting measures of central tendencies and distribution, to convey information in the data.
		A6.3.4 Make projections based on available data and evaluate whether or not inferences can be made given the parameters of the data.	A6.4.4 Analyze the validity of statistical conclusions and the use, misuse, and abuse of data caused by a wide variety of factors including choices of scale, inappropriate choices of measures of center, incorrect curve fitting, and inappropriate uses of controls or sample groups.
A6.1.5 Find and record the possibilities of simple probability experiments; explain differences between chance and certainty, giving examples.	A6.2.5 Estimate whether a game is mathematically fair or unfair; analyze and present probability data using simple fractions.	A6.3.5 Use tree diagrams and sample spaces to make predictions about independent events.	A6.4.5 Analyze data from multiple events and predict theoretical probability; find and compare experimental and theoretical probability for a simple situation, discussing possible differences between two results.
A6.1.6 Conduct a survey and tally the results.	A6.2.6 Conduct simple probability experiments using concrete materials and represent the results using fractions and probability.	A6.3.6 Design and conduct a simulation to study a problem and communicate the results.	A6.4.6 Design, conduct, analyze, and communicate the results of multi-stage probability experiments.

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
B. Problem-Solving			
B1.1.1 Formulate problems from practical and mathematical activities.	B1.2.1 Read and summarize a problem, using mathematical terms and symbols.	B1.3.1 Analyze and summarize a problem using the relationships between the known facts and unknown information.	B1.4.1 Recognize and formulate mathematical problems from within and outside the field of mathematics.
B1.1.2 Develop and apply strategies including guess and check, modeling and acting out, drawings, and extending patterns to solve a variety of problems.	B1.2.2 Select and apply a variety of strategies including making a table, chart or list; drawing pictures; making a model; and comparing with previous experience to solve problems.	B1.3.2 Select, modify, and apply a variety of problem-solving strategies including graphing, inductive and deductive reasoning, Venn diagrams, and spreadsheets.	B1.4.2 Apply multi-step, integrated, mathematical problem-solving strategies, persisting until a solution is found or it is clear no solution exists.
B1.1.3 Predict an answer before solving a problem and compare results to check for reasonableness.	B1.2.3 Explain and verify results of the original problem and apply what was learned to new situations.	B1.3.3 Evaluate, interpret, and justify solutions to problems.	B1.4.3 Verify the answer by using an alternative strategy.

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
C. Communication			
C1.1.1 Translate problems from everyday language into math language and symbols.	C1.2.1 Use the mathematical vocabulary appropriate to the problem.	C1.3.4 Use math vocabulary, symbols, and notation to represent information in the problem.	C1.4.1 Use appropriate technology to represent the information and ideas in a problem.
C1.1.2 Use manipulatives, models, pictures, and language to represent and communicate mathematical ideas.	C1.2.2 Represent mathematical and practical situations using concrete, pictorial, and symbolic representation.	C1.3.2 Represent a problem numerically, graphically, symbolically; translate among these alternative representations.	C1.4.2 Use numerical, graphic, and symbolic representations to support oral and written communication about math ideas.
C1.1.3 Use everyday language to explain thinking about problem-solving strategies and solutions to problems.	C1.2.3 Organize and communicate mathematical problem-solving strategies and solutions to problems.	C1.3.3 Use appropriate vocabulary, symbols and technology to explain, justify, and defend mathematical solutions.	C1.4.3 Explain, justify and defend mathematical ideas, solutions, and methods to various audiences.

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
D. Reasoning			
D1.1.1 Draw conclusions about mathematical problems.	D1.2.1 Draw logical conclusions about mathematical situations.	D1.3.1 Use informal deductive and inductive reasoning in both concrete and abstract contexts.	D1.4.1 Follow and evaluate an argument, judging its validity using inductive or deductive reasoning and logic.
D1.1.2 Find examples that support or refute mathematical statements.	D1.2.2 Given a rule or generalization, determine whether the example fits.	D1.3.2 State counterexamples to disprove statements.	D1.4.2 Make and test conjectures.
D1.1.3 Explain why a prediction, estimation, or solution is reasonable.	D1.2.3 Justify answers and mathematical strategies as reasonable.	D1.3.3 Justify and defend the validity of mathematical strategies and solutions using examples and counterexamples.	D1.4.3 Use methods of proofs including direct, indirect, and counterexamples, to validate conjectures.

ALASKA MATHEMATICS PERFORMANCE STANDARDS

<i>To be assessed in Grade 3</i>	<i>To be assessed in Grade 6</i>	<i>To be assessed in Grade 8</i>	<i>To be assessed on High School Graduation Qualifying Exam</i>
Between ages 5-7, students:	Between ages 8-10, students know and are able to do everything required at earlier ages and:	Between ages 11-14, students know and are able to do everything required at earlier ages and:	Between ages 15-18, students know and are able to do everything required at earlier ages and:
E. Connections			
E1.1.1 Apply mathematical skills and processes to literature.	E1.2.1 Apply mathematical processes to social studies.	E1.3.1 Apply mathematical skills and processes to science and humanities.	E1.4.1 Apply mathematical skills and processes to global issues.
E1.1.2 Apply mathematical skills and processes to situations with self and family.	E1.2.2 Apply mathematical skills and processes to situations with friends and school.	E1.3.2 Apply mathematical skills and processes to situations with peers and community.	E1.4.2 Describe how mathematics can be used in knowing how to prepare for careers.



APPENDIX 2

**Practice Tests,
Scoring Guides,
and Test Item Maps
for the Grade 3
Benchmark Exams**

APPENDIX 2
PRACTICE TESTS

READING ASSESSMENT

THE PRACTICE TESTS

The Benchmark **PRACTICE TESTS** were developed to give students and teachers a practical way to become familiar with the kinds of test items that will appear on the Alaska Benchmark Examinations. The practice tests are in no way a predictor of the test taker's grade on the actual Benchmark tests, nor are the practice test questions the same questions that will be on the actual Benchmark tests. The type size of the actual practice tests has been reduced for purposes of this Teacher's Guide.

The **SCORING GUIDES** for the Benchmark Practice Tests provide both correct answers and the guidelines used to score "constructive-response" questions on the practice tests.

The **TEST ITEM MAPS** show the number of questions of each type that measure particular performance standards on each practice test.

PRACTICE TEST—Reading, Grade 8

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SAMPLE QUESTIONS

Directions: Read the short article "Fast Tracks." Then do the two sample questions.



Fast Tracks

The fastest person can run about 26 miles per hour. However, there are even faster speeds in the animal world. Did you know that the ostrich can run up to 40 miles per hour? The cheetah, however, wins the race. It can dash up to 60 miles per hour when running on flat ground for short distances. Now that's impressive!

Sample A

This passage is mostly about

- (A) how the cheetah wins races
- (B) how people can run at impressive speeds
- (C) how some animals can run faster than people
- (D) how the ostrich can run up to 40 miles per hour

Sample B

Look at the picture next to the article. Which of the runners pictured is most likely to win a short race?

Using the information from the article, explain why you chose that runner.

**PRACTICE
QUESTIONS**

Directions: Read this story about two good friends and what happens to their friendship. Then do Numbers 1 through 6.

Best Friends

By Leslie Hall



Carmen had moved into the house across the street on a burning hot summer day. It was the summer before we started kindergarten. We soon became fast friends and did everything together; we learned to ride bikes on the same day (and have matching scars on our knees to prove it), explored the backwoods and made up treasure hunts in the land behind her house, started to like guys at the same time, and always tried to get all our classes together. We would have done anything for each other. My mom didn't let me get my ears pierced until I was thirteen, and even though Carmen's mom had told her she could get hers done earlier, Carmen waited so we could get our ears pierced together.

At the jewelry store, the lady showed us trays and trays of earrings. I chose a pair of tiny silver half-moons, and Carmen got a pair of little silver stars, and then we each gave the other one of our earrings and never took them out. Everyone at school called us the Twins, and if I were alone, would say, "Where's your Twin?" instead of "Where's Carmen?"

So when things started changing, I wasn't ready. Carmen decided she was going to try out for the school paper, which I didn't want to do. She said I should join the art club, because I like to draw, and then we could still walk home from school together later. I never got around to joining. The art teacher, Mr. Langley, sometimes tells me I have talent, and other times, he gives me back a drawing with a note that says he knows I can do better. I feel the same way. Sometimes, I look at a drawing I've done and I think it's horrible, and if anyone says anything nice, I think they're just trying to be nice because they know I feel bad. At least I know that's not how it is with Mr. Langley. He wants me to enter an art contest sponsored by a gallery he knows, but I'm not sure.

My favorite picture is a pencil drawing I did last summer of Carmen at the beach: she is asleep, lying on a blanket in the sand. She looks beautiful, with her hair falling over her shoulder. I even drew in the half-moon earring. When she liked the drawing, I gave it to her, and her mom framed it and hung the picture on the wall in Carmen's room.

Then, little things started to bug me, like how she didn't seem interested in the same things we have always talked about for hours together. When she first started on the *Gazette*, she said something about this guy Ryan being so great, what with his dark and mysterious eyes and all, plus his incredible knack for recognizing talent—he had said she was a great writer. So I called her up. "How's Ryan?"

"What? Oh, fine," she said, sounding distracted. "Look, Jen, I'm in the middle of something, can I call you back?"

She became a reporter for the paper, and all of a sudden, *if* she had time for me, all she could talk about was The *Garfield Gazette* and her next assignment and the editors, Kim and Ryan. Sure, I'll admit it: I was jealous, in a big, ugly way.

Yesterday, we were having lunch together in the quad, and I was telling her about how Todd Greenway traded lockers so now he has the locker two lockers down from me, and how I bumped into him accidentally and he smiled and said, “No problem” when I kept saying I was sorry and how clumsy I was.

Carmen didn’t hear a word. She took another bite of her sandwich, then looked at it critically. “Kim wants me to do a story on the cafeteria over-charging. Look at this sandwich—it only has one tiny miserable little piece of cheese, and look how much it costs!”

I was mad, but before I could say anything, the bell rang and we went to class. Then after school Carmen went off to the *Gazette* office and I went home. Usually I would have called her that night, but I thought by not calling I would give her a chance to think about what happened, and she would realize that I had feelings, too. And she had stomped on all of them.

She didn’t call.

Today, I stopped at her house on the way to school, like I always do. When she opened the door, she had a piece of toast in one hand and her hair was still wet. Teeny, her little sister, was standing behind her, wearing only a pair of underwear and her shoes and socks. “Can you help me?” Carmen said. “I still need to do my hair.”

“Okay,” I said, but in a kind of grumpy voice, so she would know I was still mad.

“Last night, after we finished at the paper, we went for pizza”—she yelled from the bathroom—“and I didn’t get home until late, and then I had to do my homework, and then my mom told me this morning she had to leave early, and would I get Teeny ready and drop her off.”

Carmen said something else, but I couldn’t hear her over the sound of the blow-dryer. So that’s why she hadn’t called. I finished buttoning up Teeny’s dress.

Carmen came running out of the bathroom and grabbed her backpack. I held Teeny’s hand and we left, dropping Teeny off at kindergarten on the way.

“Lucky for us the stupid elementary school is next to the high school,” I said in a meaner voice than I had intended.

Carmen looked at me in surprise, “What are you mad about?”

I didn’t say anything.

“Well, if it’s such a big deal to wait for me, don’t do it next time, then.” Carmen walked away, even though we had our first class together. She turned back for a second and said something that sounded like “And I thought you’d be happy!”

Happy about what? Happy to lose my best friend to Kim and Ryan? Happy that she didn’t even care that Todd Greenway, who had never really talked to me before, had actually noticed my existence?

Soon it was lunch, and I thought maybe we would still eat lunch together, but after waiting by the locker for a long time, I decided to go to the art room and work on a charcoal drawing.

Mr. Langley came in after me and looked over my shoulder at the drawing. “Coming along,” he said, and sat at his desk to eat his lunch. “Where’s the Twin?”

“I don’t know,” I said, “Probably at the *Gazette*. That’s all she cares about now, anyway.”

“Well, it’s important to have something to care about,” he said. “Especially if you’re talented, which she is. Did you see her article in today’s paper?”

As I walked to my locker, I thought about what he’d said. I knew how important being on the paper was to Carmen, and I hadn’t even read her first article! Maybe she was neglecting our friendship, but I got an ugly squishy muddy kind

of feeling—the kind of feeling that doesn’t do anything, but just lies in a horrible mess in the pit of your stomach—that told me that I was acting like a spoiled brat.

Todd was at his locker and said “hi” to me. I was so surprised, I felt my brain freeze up, and finally squeaked back, “Hi.” I blushed and immediately looked at the lock as I fumbled with the combination. I was sure he was thinking about what an idiot I was. First I bashed into him in the hallway, then I couldn’t even say hello. I got the lock open, pulled out my books and shut the locker. I was shocked to see him still there when I looked up.

“I didn’t know you were an artist,” he said. “I like to draw, too.”

At first, it was as if he was speaking in a foreign language. “What?”

“I didn’t know you were an artist. I saw your drawing in the *Gazette*.” He took the paper out of a folder and gave it to me. “On the last page. It looks great.”

I opened the *Gazette* to the last page and stared. There was my drawing of Carmen, the one from the beach. It took up the whole page. There was a banner across the top that said “Art Forum” and the title and my name were in big letters across the bottom: “Sleeping Girl” by local artist Jennifer Collins.

“Maybe we can get together to draw sometime,” Todd said.

I had to find Carmen. That was what she had been saying this morning. That was why she had thought I would be happy. She must think I’m the biggest jerk in the world.

I remembered how the last night of the summer, before school started, we had been lying on the balcony. The sky had looked like a huge piece of black velvet, with the stars sprinkled in the darkness like diamonds. I had said I wished that I could paint how beautiful the sky was, and how lying there and looking at the sky made me feel happy, but a little sad, too, because it would never be the same. “You can,” Carmen had said. “You’re so talented, you can paint anything.” I never once thought about her, about the stories she would tell me, about her wanting to write for the paper. She had never stopped being my friend; I had stopped being a friend to her.

“I’d really like to,” I told him. “I have to go now, but—”

“I’ll call you.”

I was so happy. I didn’t deserve to be so happy. My heart felt like it was going to pound out of my chest, and I turned and almost ran off down the hall. I glanced back and Todd was standing by his locker, looking after me.

“Maybe on Saturday?” he yelled, and I waved and went to find my best friend.

1. This short story is mostly about

- Ⓐ a girl who becomes a well known artist
- Ⓑ two friends who help each other in school
- Ⓒ two friends who like to do the same things
- Ⓓ a girl who realizes she has not been a good friend

2. When Jennifer says, “so when things started changing, I wasn’t ready,” she means

- Ⓐ the girls had different interests now
- Ⓑ the girls no longer had the same earrings
- Ⓒ Jennifer was no longer interested in writing
- Ⓓ Jennifer was no longer interested in being an artist

3. Another title for this story might be

- Ⓐ Jennifer at School
- Ⓑ Carmen at the Beach
- Ⓒ How to Be a Friend
- Ⓓ How to Make a Friend

4. Reread the following sentence from the story:

The sky had looked like a huge piece of black velvet, with the stars sprinkled in the darkness like diamonds.

What is the sky being compared to?

- Ⓐ the Milky Way
- Ⓑ the drawing of Carmen
- Ⓒ a display in a jewelry store
- Ⓓ a large piece of chocolate cake

5. Which of the following sentences is an opinion?

- Ⓐ At the jewelry store, the lady showed us trays and trays of earrings.
- Ⓑ Today, I stopped at her house on the way to school, like I always do.
- Ⓒ When she liked the drawing, I gave it to her, and her mom framed it and hung the picture on the wall in Carmen's room.
- Ⓓ Sometimes, I look at a drawing I've done and I think it's horrible, and if anyone says anything nice, I think they're just trying to be nice because they know I feel bad.

6. At the end of the story, Jennifer says she had stopped being a friend. Write a paragraph explaining how Jennifer had stopped being a friend and why. Use details from the passage to support your answer.

Directions: Weather is an important part of daily life. People have always talked about the weather and have come up with many sayings to help them deal with the unpredictability of weather. Read about some of these sayings. Then do Numbers 7 through 11.

Weather or Not

“When cows lie down, expect to drown.”

For centuries, people have been trying to predict the weather and inventing aphorisms¹ that purport to explain their findings. Some of these little sayings actually contain a kernel of truth. If you are driving in the country, for ex-

ample, and notice that the cows are lying down, or perhaps gathered cozily together in the corner of the field, get out your bumbershoot²: there's probably a storm brewing.

This is a maddening thought. If we humans, with our roving satellites and pulsing electronic machines cannot predict consistently when it's going to rain, how can a cow do it?

Furthermore, what warns bees to return to their hives before the deluge? Why should we be wary of wet skies when we notice that spiders have stopped spinning their webs, and ants are crawling in straight lines? How can high flying birds warn us of thunderstorms? And what about that pesky groundhog?

We know what the cow is up to when she lies down. Cows don't like lying on wet grass, so they will protect a little patch of dry stuff when they sense rain coming. But what sense do they use? Why don't we have one like it? Evidently, cows know how to differentiate a change in humidity, which indicates to them that the sky is about to fall. Bees share this sensitivity, and buzz back home before the downpour. Spiders, using a little common sense, realize the futility of building complicated webs just before an event that will rip them apart. Why waste all that energy?



Ants are a bit more complicated. They lay trails of pheromones³ from food sources back to the nest. When humidity causes the air to dampen, the pheromone trail is reinforced and stays in place longer, but with dry air the trail fades and the ants must scurry around, searching for it.

If you notice certain birds flying high on a warm day, you might want to move the laundry inside. They are searching for insects up there, bugs that got elevated by rising currents of warm air that go along with the kind of weather that often comes before a thunderstorm.

Many of man's early attempts to predict the weather produced sayings that we still consider definitive. A ring around the moon means rain; "Clear moon, frost soon"; a moon lying on its back surely indicates a nasty day ahead. It is true that a halo around the moon can signal the presence of certain clouds that precede an advancing storm. But a clear night without a moon is often followed by a nippy morning, and the phases of the moon have nothing to do with the weather report.

Predicting the seasons is another game that is fraught with superstition and folklore. Farmers especially have good reason to want to know what kind of a mess they will be slogging through at planting or harvesting time, so they sometimes can be found observing birds, badgers, or groundhogs, hoping for a hint.

Our friend the groundhog comes out on February 2 and looks around. As the tale goes, if it sees its shadow it becomes frightened and goes back in—a sign that there will be six more weeks of winter. How reliable is this furry little prognosticator⁴? It turns out that "Groundhog Day" is also the European "Candlemas Day," when spring planting is traditionally supposed to begin. A

¹ aphorism: a rule given in the form of a short saying

² bumbershoot: an umbrella

³ pheromone: a chemical produced by an animal which influences the behavior of others of the same species

⁴ prognosticator: one who predicts

⁵ marmot: a woodchuck

clear day indicates a high pressure system that can be followed by another high, both accompanied by frigid weather. So our sensitive little marmot⁵ may be giving us some real help, here.

A sure sign of a cold winter is “When birds and badgers are fat in October.” A tough time is ahead if there is frost on the “shortest day,” which falls just before Christmas. The list goes on: “When March has April weather, April will have March weather, too”; “Moist April, clear June”; “Wet May, dry July”; etc.

Unfortunately, predictions based on certain days or months are mostly fraudulent; the statistics just don’t support them.

When all is said and done, perhaps the best summary is that of poet Celia Laighton Thaxter (1835–1894) who said:

*Sad soul, take comfort, nor forget
That sunrise never failed us yet.*

7. What do bees and cows have in common?

- Ⓐ They don’t like wet grass.
- Ⓑ They go home before it rains.
- Ⓒ They can detect changes in humidity.
- Ⓓ They watch birds to tell when a storm is coming.

8. This passage is mostly about

- Ⓐ how animals predict the weather
- Ⓑ the history of weather prediction
- Ⓒ how to invent aphorisms to predict the weather
- Ⓓ the value of aphorisms in predicting the weather

9. According to the passage, the phases of the moon are

- Ⓐ not involved in weather prediction
- Ⓑ important as a guide to planting crops
- Ⓒ somewhat reliable in weather prediction
- Ⓓ linked to the behavior of high flying birds

10. This passage is an example of

- Ⓐ a drama
- Ⓑ fiction
- Ⓒ nonfiction
- Ⓓ a short story

11. According to the passage, when ants lose track of their pheromone trails it tells us that

- Ⓐ it is a dry day
- Ⓑ rain is on its way
- Ⓒ humidity is high
- Ⓓ it is a windy day

Directions: Icebergs have always been a problem for sailors. Read this article about icebergs to find out what is being done to help. Then do Numbers 12 through 18.

ICEBERG RIGHT AHEAD!

These Trackers Work To Prevent *Titanic: The Sequel*

By Gail Skroback Hennessey

“Icebergs below!” These words electrify the crew flying 8,000 feet above the frigid North Atlantic Ocean. Taking the aircraft down close to the bergs, commander Steven Sielbeck gazes out at huge mountains of ice. It’s an awesome sight that few people ever see.

Commander Sielbeck is an “ice pick.” That’s what people call ice watchers for the International Ice Patrol (IIP). The IIP tracks icebergs that drift into North Atlantic shipping lanes each spring and summer. The group warns ships so they can steer clear of these huge blocks of ice that move through the ocean.

What can a berg do to a ship? “*Titanic*” damage! In 1912, *Titanic* was the biggest ship in the world. People thought nothing could sink it. But on its first voyage, something did. *Titanic* ran into a huge iceberg and quickly sank. Of the 2,224 people on board, more than 1,500 died.

The sinking of *Titanic* frightened people who sailed between Europe and North America. Shippers realized a patrol was needed to locate icebergs and warn ships to steer clear of them. A year after *Titanic* sank, the IIP was started.

Today, 17 countries support the IIP. They’ve gotten their money’s worth over the years. According to Sielbeck, “Since we have been doing the job, nobody who followed our safety information has lost his life.”

ICEBERG ALLEY

The icebergs that endanger North Atlantic shipping lanes form when chunks of glaciers break off from Greenland. Currents move the icebergs about 2,500 miles toward the Grand Banks, off Newfoundland, Canada. That’s where the busiest shipping lane in the world is located. The IIP calls the area where the icebergs travel “Iceberg Alley.” “It’s like a constant conveyor belt of icebergs,” Sielbeck told CONTACT KIDS. Many bergs melt before reaching this area. But in 1998, about 1,300 icebergs were spotted by the IIP.

Part of the U.S. Coast Guard, the IIP has 16 staff people. But this small group does a big job. To make sure they find every berg, the IIP patrols an area nearly one-half million square miles. That’s about twice the size of Texas.

The IIP crews use radar to spot icebergs. But they also use their eyes. That’s because smaller bergs, called “growlers” or “berg bits,” aren’t as easy to detect by radar.

Ice picks like Sielbeck track icebergs and record their position, size, and shape. They also drop special buoys into the water. These devices record ocean temperature and sea current flow.



All this information is fed into computers located at IIP headquarters in Groton, CT. The computers predict how much the bergs will melt and in what direction they'll drift. Every day, this information is sent by radio and the Internet to shippers. For the 2,000 ships that sail the North Atlantic every year, the IIP is a real lifesaver.

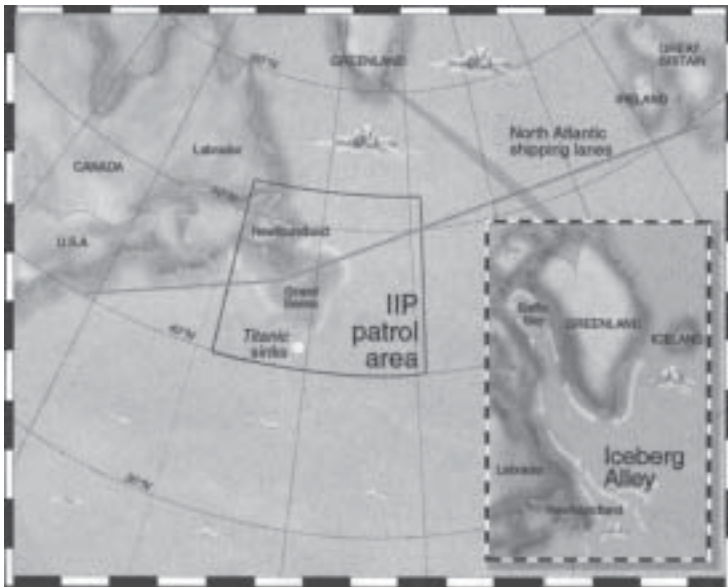
BERGS ARE COOL!

Saving lives can be risky business. "The Grand Banks of Newfoundland has some of the worst weather in the world," explains Sielbeck. More than half the time it's foggy. Storms can bring lightning and high winds. Sometimes ice forms on the airplane's wings. Flying in these conditions is ultra-dangerous.

But for Sielbeck, seeing icebergs up close and personal makes it all worthwhile. "Imagine seeing a chunk of ice the size of the Texas Astrodome drifting in the ocean!" he says. "You never get tired of looking at them."



- 1** An iceberg we see today began its life as a flake of snow falling on land. Over years—sometimes centuries—the snow crushes snowflakes beneath it, packing down the snow.
- 2** Year after year, the layers of snow melt and refreeze until they form layers of ice thousands of feet thick. The pressure of newer snow causes older layers of ice to move over land. The moving ice is called a glacier.
- 3** The glacier slowly moves forward until it reaches the sea. Then ocean tides cause chunks of glacier to break off, or calve. When the chunk falls into the ocean, an iceberg is born.
- 4** Ocean currents carry the berg south. Greenland produces thousands of bergs a year. But only about one percent reach the Atlantic. Most melt after six months. So icebergs usually end up as ice cubes!



The area between Greenland and Labrador, Canada, is known as “Iceberg Alley.” Most icebergs flow into North Atlantic shipping lanes through here.

Bergy Bits



Very small icebergs are called growlers. They can be as small as a piano. “Growlers got their name,” says Sielbeck, “because they make a peculiar growling noise as the waves lift them up and down in the water. In the old days, sailing ships would listen for that growling sound in the fog. If they heard it, they knew an iceberg was ahead.”



The biggest icebergs can be larger than a city block. Experts guess that the iceberg that sank the *Titanic* was a whopper. It was about 100 feet high and 300 feet long. The biggest iceberg ever recorded was sighted near Antarctica. The berg was the size of Rhode Island.



Over the years, people have tried to blow up icebergs with dynamite, torpedoes, naval cannons and machine guns. None of these ideas worked. The only thing that can stop an iceberg is warm water!



More Bits



The IIP flies missions from January to August.



Each IIP patrol plane flies seven-hour missions for five straight days. Two weeks later, they do it again.



The IIP once tracked an iceberg as far south as the island of Bermuda.



About 7/8 of an iceberg is under water.



Most icebergs are white, but some are blue, green, or gold. The colors are caused by a berg's thickness, the shape of its ice crystals and by rocks or soil in the ice.



The tallest berg ever sighted by the IIP stretched 550 feet above the sea—about the height of the Washington Monument. The section of the iceberg below the surface was nearly twice the height of the Empire State Building.



Glaciers in Greenland calve up to 30,000 icebergs yearly.

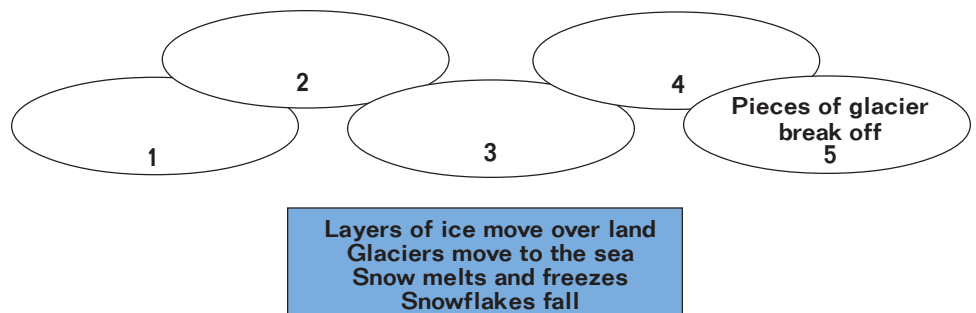


Glaciers contain 75 percent of the world's fresh water.



During iceberg season, icebergs can drift as far south as Maryland.

12. When the author says that an iceberg can do “Titanic” damage, she probably means the damage is
- Ⓐ gigantic
 - Ⓑ different
 - Ⓒ noticeable
 - Ⓓ understandable
13. It is important for “ice picks” to record the flow of ocean currents because
- Ⓐ the flow of currents helps form icebergs
 - Ⓑ currents are responsible for moving icebergs
 - Ⓒ currents interfere with the formation of icebergs
 - Ⓓ the currents prevent the IIP from finding icebergs
14. The best definition of an iceberg is a
- Ⓐ glacier that is quite large
 - Ⓑ part of a glacier that is melting
 - Ⓒ glacier that moves toward the sea
 - Ⓓ piece of glacier that falls into the water
15. When the author says that most icebergs usually end up as ice cubes she means that
- Ⓐ icebergs are mostly composed of fresh water
 - Ⓑ like an ice cube, $\frac{7}{8}$ of an iceberg is underwater
 - Ⓒ most icebergs melt before they reach the Atlantic
 - Ⓓ icebergs look like ice cubes from the search planes
16. Why is the IIP necessary?
- Ⓐ to provide aircraft and weather information
 - Ⓑ to get international recognition for the “ice picks”
 - Ⓒ to locate icebergs and warn ships to stay clear of them
 - Ⓓ to keep records of how many icebergs are formed in a year
17. What are the steps in the formation of an iceberg? Fill in the ovals using the phrases in the box below. The last one has been done for you.



18. Think about the articles “Iceberg Right Ahead!” and “Weather or Not.” Complete the chart by identifying two differences and two similarities between the articles.

<div>“Iceberg Right Ahead!”</div> <div>“Weather or Not”</div>	
Similarities	Differences

SCORING GUIDE—Reading, Grade 8

MULTIPLE-CHOICE
QUESTIONS

Sample A C

- 1. D
- 2. A
- 3. C
- 4. C
- 5. D
- 7. C
- 8. D
- 9. A
- 10. C
- 11. A
- 12. A
- 13. B
- 14. D
- 15. C
- 11. C

CONSTRUCTED-
RESPONSE
QUESTIONS

Sample B

Look at the picture next to the article. Which of the runners pictured is most likely to win a short race? Using information from the article, explain why you chose that runner.

Exemplary Response:

The cheetah is most likely to win a short race.
I chose the cheetah as the winner of the short race because the article says that it runs up to 60 miles per hour on flat ground for short distances.

Score Points: 2 points possible

- 1 point for cheetah
- 1 point for supporting evidence from the article

Item 6

At the end of the story, Jennifer says she had stopped being a friend. Write a paragraph explaining how Jennifer had stopped being a friend and why. Use details from the passage to support your answer.

Exemplary Response:

Jennifer realized that she had been so caught up in her feelings and her own life that she had forgotten to consider what Carmen was going through. She had not paid attention to what Carmen was doing so she was as much to blame. Then she blamed Carmen for their no longer being friends.

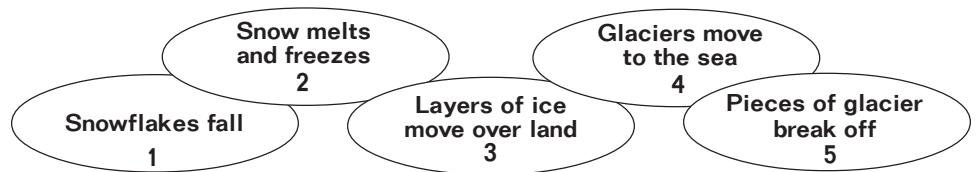
Score Points: 2 points possible

- 1 point for the idea that Jennifer had forgotten to consider Carmen's feelings or problems or the changes in Carmen's focus, and blamed Carmen
- 1 point for at least one supporting detail from the story

Item 17

What are the steps in the formation of an iceberg? Fill in the ovals using the phrases in the box below. The last one has been done for you.

Exemplary Response:



Score Points: 4 points possible

- 1 point for each oval filled in correctly

Item 18

Think about the articles “Iceberg Right Ahead!” and “Weather or Not.” Complete the chart by identifying two differences and two similarities between the articles.

Exemplary Response:

“Iceberg Right Ahead!”	“Weather or Not”
Similarities	Differences
Subject—Both are written about natural phenomena	Tone—“Weather or Not” is humorous and “Iceberg right Ahead!” is more scholarly
Genre—Both are nonfiction passages	Purpose—“Weather or Not” is written to entertain and “Iceberg Right Ahead!” is written to inform
Theme—Both are about what people can do to live safely and more easily with nature	Content—“Weather or Not” is about sayings and “Iceberg Right Ahead!” is about specific events, tasks

Score Points: 6 points possible

- 1 point for each correct answer

TEST ITEM MAP—Reading, Grade 8

Number of Test Questions by Performance Standard

PERFORMANCE STANDARDS	NUMBER OF TEST QUESTIONS			PERCENT OF EMPHASIS	TOTAL RAW SCORE POINTS
	MULTIPLE-CHOICE	SHORT RESPONSE	EXTENDED RESPONSE		
Reading Totals	30	5	1	100%	41
R3.1 Determine meaning of words	3	1		10%	4
R3.2 Support understanding of a theme	3	1	1	20%	8
R3.4 Restate and summarize information; make connections	4	2		17%	7
R3.5 Identify and assess evidence that supports main ideas	5			12%	5
R3.6 Read and follow multi-step directions	4			10%	4
R3.7 Explain conventions of genres	4			10%	4
R3.8 Analyze narrative elements	3	1		12%	5
R3.9 Differentiate fact and opinion; analyze author's purpose	4			10%	4

WRITING ASSESSMENT

THE PRACTICE TESTS FOR READING, WRITING AND MATHEMATICS

The Benchmark **PRACTICE TESTS** were developed to give students and teachers a practical way to become familiar with the kinds of test items that will appear on the Alaska Benchmark Examinations. The practice tests are in no way a predictor of the test taker's grade on the actual Benchmark tests, nor are the practice test questions the same questions that will be on the actual Benchmark tests. The type size of the actual practice tests has been reduced for purposes of this Teacher's Guide.

The **SCORING GUIDES** for the Benchmark Practice Tests provide both correct answers and the guidelines used to score "constructive-response" questions on the practice tests.

The **TEST ITEM MAPS** show the number of questions of each type that measure particular performance standards on each practice test.

PRACTICE TEST—Writing, Grade 8

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SAMPLE QUESTIONS

Sample A

Directions: A student wrote a paragraph about a school game. There are some mistakes that need correcting.

1 After school, we checked out the big game. 2 Playing the team from across town. 3 The game lasted for over three hours, but it was exciting the whole time. 4 We won in the final minute!

Choose the best way to write Sentence 2.

- (A) Our team playing the team from across town.
- (B) Having to play the team from across town.
- (C) Our team was playing the team from across town.
- (D) Best as it is: Playing the team from across town.

Sample B

Where would this sentence best fit in the paragraph?

Now we're the best team in the city.

- (A) after Sentence 1
- (B) after Sentence 2
- (C) after Sentence 3
- (D) after Sentence 4

PRACTICE QUESTIONS

Sample C

There are four mistakes in this paragraph. Let's correct them together.

In the summer, the days are more longer, so there is time to do things I enjoy. I can ride my bike. And go swimming. I can also plays in the park with my friends.

Directions: Karina wrote a report for her science class. There are some mistakes that need correcting.

1 The monarch butterfly is the bestest known of all the butterflies that migrate. 2 Also known as the milkweed butterfly. 3 The milkweed plant is their favorite food. 4 The monarch butterfly smells with its legs. 5 In fall, these butterflies join together in 20-mile-wide swarms as they travel from Canada and the northern United States toward the south. 6 Each year they follow the same route to the warmer climates of California and Mexico. 7 In these southern areas, they gather in trees in large numbers to spend the winter in a state of semi-hibernation. 8 In the spring, they migrate back to the northern areas some populations of monarchs travel as far as 4,000 miles round trip.

1. Choose the best way to write Sentence 1.

- (A) The monarch butterfly is the best knowing of all the butterflies that migrate.
- (B) The monarch butterfly is the better known of all the butterflies that migrate.
- (C) The monarch butterfly is the best known of all the butterflies that migrate.
- (D) Best as it is: The monarch butterfly is the bestest known of all the butterflies that migrate.

2. Which of these sentences best combines Sentences 2 and 3?

- (A) Also known as the milkweed butterfly, so the milkweed plant is their favorite food.
- (B) They are also known as the milkweed butterfly because the milkweed plant is their favorite food.
- (C) Also known as the milkweed butterfly, yet the milkweed plant is their favorite food.
- (D) They are also known as the milkweed butterfly and the milkweed plant is their favorite food.

3. Choose the best way to write Sentence 6.
- Ⓐ Each year they followed the same route to the warmer climates of California and Mexico.
 - Ⓑ Follow the same route to the warmer climates of California and Mexico each year.
 - Ⓒ Following the same route to the warmer climates of California and Mexico each year.
 - Ⓓ Best as it is: Each year they follow the same route to the warmer climates of California and Mexico.
4. Choose the sentence that contains two complete thoughts and should be written as two sentences.
- Ⓐ Sentence 1
 - Ⓑ Sentence 4
 - Ⓒ Sentence 5
 - Ⓓ Sentence 8
5. Which sentence does not belong in this paragraph?
- Ⓐ Sentence 4
 - Ⓑ Sentence 5
 - Ⓒ Sentence 6
 - Ⓓ Sentence 7
6. A student wrote a paragraph about an interview she did for her social studies class. There are six mistakes in spelling, grammar, and punctuation. Draw a line through each mistake and write the correction just above it.

The woman I interviewed for my report remind me of my grandmother in alaska. Their was similarities in age and other physical characteristics. She even talked like my grandmother. She is also very kind and offered me chocolate chip cookies, milk and ice cream. Like my grandmother, she also seemed to enjoy eating.

7. Write a letter to your new pen pal in another country. Introduce yourself and explain what your life is like in Alaska. Your pen pal can be in any country you choose. You do not have to use all the lines.



For this answer, make sure you use complete sentences and check your work for correct spelling, capitalization, and punctuation.



Use the **Writing Skills Checklist** below.

Use it

- to plan your writing
- to check your writing when you are done

Writing Skills Checklist

1. Have you written a letter that has a single topic, is supported with details, has well-developed paragraphs, and has a conclusion?
2. Have you written a letter that will make sense to the people who read it?
3. Have you chosen your words carefully?
4. Have you written complete sentences?
5. Have you used correct grammar?
6. Have you used correct capitalization and punctuation?
7. Have you spelled all the words correctly?
8. Have you written your letter clearly so that anyone can read your writing?

Date: _____

Dear _____ ,

 _____ *[More lines follow]* _____

Your friend,

Directions: Todd wrote a report about seashells for his science class. Read the first part of his report. There are some mistakes that need correcting.

1 The outstanding feature of a seashell was its hardness. 2 Curiously, these hard shells had been the products of soft-bodied, fleshy animals called mollusks. 3 Wherever the mollusk lives, it must keep its body moist to stay alive. 4 The shells act like armor to protect them. 5 Mollusks have no bones. 6 Their shells support them the way the skeleton maintains the human body. 7 There are about 100,000 species of mollusks. 8 Some of the shells have beautiful shapes and colors. 9 Others are quite plain.

8. Which of these shows the best way to write Sentence 1?

- (A) The outstanding feature of a seashell is its hardness.
- (B) The outstanding feature of a seashell are its hardness.
- (C) The outstanding feature of a seashell were its hardness.
- (D) Best as it is: The outstanding feature of a seashell was its hardness.

9. Choose the best way to write Sentence 2.

- (A) Curiously, these hard shells were the products of soft-bodied, fleshy animals called mollusks.
- (B) Curiously, these hard shells is the products of soft-bodied, fleshy animals called mollusks.
- (C) Curiously, these hard shells are the products of soft-bodied, fleshy animals called mollusks.
- (D) Best as it is: Curiously, these hard shells had been the products of soft-bodied, fleshy animals called mollusks.

10. Choose the best way to combine Sentences 5 and 6.

- (A) Mollusks have no bones because their shells support them the same way the skeleton maintains the human body.
- (B) Mollusks have no bones, so their shells support them the same way the skeleton maintains the human body.
- (C) Shells support them the same way the skeleton maintains the human body, mollusks have no bones.
- (D) Supporting the mollusks that have no bones the same way the skeleton maintains the human body are shells.

11. Where would this sentence best fit in the report?

Each kind has a shell with its own unique design and shape.

- (A) after Sentence 1
- (B) after Sentence 3
- (C) after Sentence 5
- (D) after Sentence 7

12. Which of these shows the best way to write Sentence 4?

- (A) The shells acting like armor to protect them.
- (B) The shells will act like armor to protect them.
- (C) The shells have acted like armor to protect them.
- (D) Best as it is: The shells act like armor to protect them.

13. Choose the best way to combine Sentences 8 and 9.

- (A) Some of the shells have beautiful shapes and colors, while others are quite plain.
- (B) Some of the shells have beautiful shapes and colors, so others are quite plain.
- (C) Because some of the shells have beautiful shapes and colors, others are quite plain.
- (D) Because some shells are quite plain, others have beautiful shapes and colors.

14. Which sentence does not belong in this paragraph?

- (A) Sentence 1
- (B) Sentence 3
- (C) Sentence 4
- (D) Sentence 7

15. Tell about one person who has made a difference in your life. Explain how and why this person has made a difference to you. You do not have to use all the lines.



For this answer, make sure you use complete sentences and check your work for correct spelling, capitalization, and punctuation.

 _____ [More lines follow] _____

16. Select the answer choice that best supports this topic sentence.

Robert Frost has been called the most popular American poet of his time, receiving four Pulitzer Prizes in his lifetime.

- Ⓐ The Pulitzer Prize is awarded specifically for literary achievement, whereas the Nobel Prize is awarded for humanitarian achievements in various areas.
- Ⓑ Although born in California, he grew up in New England and his poetry reflects the landscape of that region.
- Ⓒ America has its share of contemporary popular poets, and many rap artists could be considered popular poets of this age.
- Ⓓ Poetry may at first seem difficult to understand, but reading a lot of it can go a long way toward mastery.

17. Choose the sentence that best fills the blank in this paragraph.

The Diary of Anne Frank was published in 1947. _____. The Franks hid in a secret annex behind the office of her father's business in Amsterdam. They stayed there for two years. Although they suffered enormous hardship, Anne always kept a positive outlook.

- Ⓐ The war was close to ending when the Franks were finally discovered.
- Ⓑ Anne was born in Frankfurt, Germany in 1929, and she and her family moved to the Netherlands in 1933.
- Ⓒ It tells the story of a young German Jewish girl and her family during the Nazi occupation in World War II.
- Ⓓ The family could only move around after dark when the office workers went home and there was less danger of being discovered.

18. Choose the sentence that is complete and is written correctly.

- Ⓐ Expressing your feelings, speaking your truth, and painting a picture with words are three important elements in writing a successful poem.
- Ⓑ Expressing your feelings speaking your truth and painting a picture with words are three important elements in writing a successful poem.
- Ⓒ Three important elements, expressing your feelings, speaking your truth, and painting a picture with words, a successful poem is written.
- Ⓓ Three important elements in a successful poem, expressing your feelings, speaking your truth, and painting a picture with words.

SCORING GUIDE—Writing, Grade 8

MULTIPLE-CHOICE
QUESTIONS

Sample A C

Sample B D

- C
- B
- D
- D
- A
- A
- C
- B
- D
- D
- A
- B
- B
- C
- A

CONSTRUCTED-
RESPONSE
QUESTIONS

Sample C

Exemplary Response:

longer
 In the summer, the days are ~~more longer~~, so there is time to do
 bike and
 things I enjoy. I can ride my ~~bike~~. ~~And~~ go swimming. I can also
 play
~~plays~~ in the park with my friends.

Score Points: 4 points possible

- 1 point for changing more longer to longer [grammar]
- 1 point for changing bike, to bike [punctuation]
- 1 point for changing And to and [capitalization]
- 1 point for changing plays to play [grammar]

Item 6**Exemplary Response:**

The woman I interviewed for my report ~~remind~~^{reminded} me of my grandmother in Alaska. ~~There~~^{was} were similarities in age and other physical characteristics. She even talked like my grandmother. She ~~is~~^{was} also very kind and offered me chocolate chip cookies, ~~milk~~^{milk,} and ice cream. Like my grandmother, she also seemed to enjoy eating.

Score Points: 6 points possible

- 1 point for changing remind to reminded [grammar]
- 1 point for changing alaska to Alaska [capitalization]
- 1 point for changing Their to There [spelling]
- 1 point for changing was to were [grammar]
- 1 point for changing is to was [grammar]
- 1 point for changing milk to milk, [punctuation]

Item 7

Write a letter to your new pen pal in another country. Introduce yourself and explain what your life is like in Alaska. Your pen pal can be in any country you choose.

For this answer, make sure you use complete sentences and check your work for correct spelling, capitalization, and punctuation.

Score Points: 6 points possible**6 POINTS****Ideas and Content**

- ideas are fresh, original, and/or insightful
- ideas are based on the writer's knowledge and/or experience
- details are relevant, telling, and contribute to the whole
- content goes beyond the obvious or predictable
- topic makes a point or tells a story

Organization

- sequencing of ideas and details is logical and effective
- introduction is inviting—draws in the reader
- conclusion is satisfying—leaves reader with a sense of resolution
- transitions are thoughtful; clearly show how ideas connect
- organization flows smoothly, seems effortless

Voice

- language is highly individual
- reader senses the person behind the words; feels an interaction with the writer

- tone gives the writing flavor, adds interest
- language is appropriate for purpose and audience
- narrative writing seems honest, appealing, heartfelt
- expository or persuasive writing reflects a strong commitment to the topic; anticipates reader's questions, shows why the reader should care or want to know more

Word Choice

- words are specific, accurate, striking
- language is natural, not overdone
- verbs are lively
- nouns and modifiers are precise
- clichés and jargon are used sparingly and only for effect

Sentence Fluency

- sentence construction makes meaning clear
- sentences are purposeful and build upon each other
- the writing has cadence; the writer has thought about sound as well as meaning
- sentences vary in length and structure
- fragments are used only for style or effect
- dialogue, if used, sounds natural

Conventions

- paragraphing reinforces the organizational structure
- grammar and usage are correct (few, if any, errors) and contribute to clarity and style
- punctuation is accurate (few, if any, errors) and guides the reader through the text
- spelling is generally correct, even of more difficult words
- the writer may manipulate conventions for stylistic effect

5 POINTS

Ideas and Content

- ideas are based on the writer's knowledge and/or experience
- details are relevant, telling, and contribute to the whole
- topic makes a point or tells a story
- some ideas are fresh and original

Organization

- sequencing of ideas and details is logical and effective
- introduction is inviting—draws in the reader
- conclusion is satisfying—leaves reader with a sense of resolution
- transitions are thoughtful; clearly show how ideas connect
- organization usually flows smoothly

Voice

- reader senses the person behind the words
- there are occasional moments that surprise, amuse, or move the reader
- tone gives the writing flavor, adds interest

- language is appropriate for purpose and audience
- narrative writing seems honest, appealing, heartfelt
- expository or persuasive writing reflects a strong commitment to the topic

Word Choice

- words are specific and accurate
- lively verbs and picturesque words and phrases are occasionally used
- language is natural, not overdone
- verbs are lively
- nouns and modifiers are precise
- clichés and jargon are used sparingly and only for effect

Sentence Fluency

- sentence construction makes meaning clear
- sentences are purposeful and build upon each other
- sentences vary in length and structure
- fragments are used only for style or effect
- dialogue, if used, sounds natural

Conventions

- paragraphing reinforces the organizational structure
- grammar and usage are correct (few, if any, errors) and contribute to clarity and style
- punctuation is accurate (few, if any, errors)
- spelling is generally correct, even of more difficult words

4 POINTS

Ideas and Content

- topic and direction are evident, but more information is needed to “fill in the blanks”
- ideas draw on knowledge and/or experience but may not move beyond general observations to specifics
- details are reasonably clear but may not be detailed, personalized, or expanded
- supporting details are present but may not “flesh out” the main point or story line
- original ideas may be blended with ones that are more obvious or predictable

Organization

- sequencing is usually logical but may be predictable or distracting
- introduction is recognizable but may not create a strong sense of anticipation
- conclusion is recognizable but may not tie up all loose ends
- transitions often work well but some connections between ideas may be unclear
- pacing is fairly well controlled but there may be some lapses (*e.g.*, moving ahead too quickly or spending too much time on less important details)
- organization mostly supports the main point or story line, with occasional lapses

Voice

- writing communicates in an earnest, pleasing manner
- voice is inconsistent: it may emerge strongly, then retreat behind general, dispassionate language
- writing hides as much of the writer as it reveals
- writer seems aware of audience and purpose but often weighs words too carefully or discards personal insights in favor of safe generalities

Word Choice

- words are mostly correct and adequate but may lack flair and color
- familiar words and phrases communicate
- attempts at colorful language are made but some may be overdone
- clichés and jargon may be used occasionally in place of fresh language

Sentence Fluency

- sentences are grammatical and hang together
- some variation in sentence length and structure; sentence beginnings are not all alike
- some transitions between sentences are missing or hidden
- parts may be stiff, awkward, choppy, or gangly
- dialogue, if used, sounds stiff at times

Conventions

- paragraphing is attempted but some paragraphs run together or begin in the wrong place
- problems with grammar or usage are not serious enough to impede or distort meaning
- terminal punctuation is usually correct; internal punctuation is sometimes missing or incorrect
- spelling is usually correct or reasonably plausible on common words; misspellings do not impede communication

3 POINTS

Ideas and Content

- topic and direction are evident, but writer may digress and go in a different direction or introduce a different topic
- ideas may not draw on knowledge and/or experience; may be general observations
- details are reasonably clear but may not be detailed, personalized, or expanded
- supporting details are present but may not “flesh out” the main point or story line or may be irrelevant to it
- original ideas are rare or absent

Organization

- sequencing is usually logical but there may be lapses or digressions
- there may be an attempt to write an introduction or conclusion but it may not be clearly recognizable as such; a conclusion, in particular, may be absent
- transitions may be attempted but not work well; connections between ideas may be unclear
- there are frequent lapses in pacing

- there is an attempt at organization but it may depart from supporting the main point or story line

Voice

- writing communicates but without much style or interest
- writing hides the writer; the reader has little or no sense of the writer behind the words
- writer shows some awareness of audience and/or purpose but is inconsistent
- writer speaks in a monotone

Word Choice

- words are mostly correct and adequate with some lapses
- familiar words and phrases communicate with some lapses
- attempts at colorful language are rare or absent
- clichés and jargon may be used as a crutch

Sentence Fluency

- sentences are usually grammatical and hang together with some lapses
- little variation in sentence length and structure; most sentence beginnings are alike
- many transitions between sentences are missing or hidden
- fragments may be present
- dialogue, if used, sounds stiff and unnatural

Conventions

- paragraphing is attempted but many paragraphs run together or begin in the wrong place
- problems with grammar or usage may be serious enough to impede or distort meaning in some instances but not overall
- terminal punctuation is usually correct; internal punctuation is sometimes missing or incorrect and errors may impede or distort meaning in some instances
- spelling errors may impede or distort meaning in some instances but not overall

2 POINTS

Ideas and Content

- topic and direction are not evident; the writer has not defined the topic in a meaningful, personal way
- information is very limited or unclear
- text may be repetitious or read like a collection of disconnected, random thoughts
- the writer does not distinguish the main ideas or critical points from the supporting details or less critical points

Organization

- sequencing needs work
- there is no real lead or introduction to set up what follows
- conclusion is missing or does not wrap things up
- transitions seldom work well, with many connections between ideas unclear

- pacing feels awkward; the writer slows to a crawl when the reader wants to move on, and vice versa
- problems with organization make it hard for the reader to get a grip on the main point or story line

Voice

- it is hard to sense the writer behind the words
- the writer does not seem to reach out to an audience or to anticipate the reader's interests or questions
- writing may communicate on a functional level but does not move or involve the reader
- writer does not seem sufficiently at home with the topic to take risks, share personal insights, or make the topic/story personal and real for the reader

Word Choice

- language is so vague and general that only the most general message comes through (*e.g.*, It was a fun time. We did lots of neat stuff.)
- persistent redundancy distracts the reader
- words are often used incorrectly, making the message hard to decipher
- clichés and jargon frequently serve as a crutch
- problems with language leave the reader wondering what the writer is trying to say

Sentence Fluency

- sentences are choppy, incomplete, rambling, or awkward; there may be many fragments
- phrasing does not sound natural; the reader must sometimes reread to get the meaning
- many sentences begin the same way and follow the same pattern (*e.g.*, subject-verb-object) in a monotonous pattern
- transitions between sentences are missing or hidden, or endless connectives create a massive jumble of language in which clear beginnings and endings are lost

Conventions

- paragraphing is missing, irregular, or so frequent (*e.g.*, every sentence) that it has no relationship to the organizational structure of the text
- errors in grammar or usage are very noticeable and may affect meaning
- punctuation is often missing or incorrect
- spelling errors are frequent, even of common words
- the reader must read once to decode, then again for meaning

Ideas and Content

- topic and direction are missing
- information is very limited or unclear
- text may be repetitious, or may read like a collection of disconnected, random thoughts

Organization

- sequencing is absent
- there is no introduction or conclusion

1 POINT

- transitions are absent
- organization is absent; writing may be a brief list

Voice

- the writer seems unaware of an audience or reader; writing seems “painful” to the writer
- writing may not communicate on a functional level
- writer seems uncomfortable with the topic

Word Choice

- language is so vague, inaccurate, and/or general that even the most general message does not come through
- words are frequently used incorrectly, making the message hard to decipher
- problems with language leave the reader unable to understand what the writer is trying to say most of the time

Sentence Fluency

- sentences are choppy, incomplete, rambling, or awkward; there may be many fragments
- the reader must frequently pause or reread
- sentences begin the same way and follow the same pattern (*e.g.*, subject-verb-object) in a monotonous pattern

Conventions

- paragraphing is missing, irregular, or so frequent that it has no relationship to the organizational structure of the text
- errors in grammar or usage are frequent and impede meaning
- punctuation is often missing or incorrect
- spelling errors are frequent and impede meaning
- the reader may be unable to decode the writing

Item 15

Tell about one person who has made a difference in your life. Explain how and why this person has made a difference to you.

For this answer, make sure you use complete sentences and check your work for correct spelling, capitalization, and punctuation.

4 POINTS

- the writer defines and stays on topic
- supporting details are relevant, develop the topic, and provide important information
- ideas and/or details are explicitly connected to the topic
- topic is developed in a logical, organized, sequential way
- words are accurate, specific, and appropriate for the purpose and audience
- colorful or figurative language may be attempted
- there is a variety of sentence structures
- sentences are purposeful, with clear transitions
- sentence structures are correct (few, if any, errors)
- grammar and usage are correct (few, if any, errors)

3 POINTS

- punctuation and capitalization are correct (few, if any, errors)
- spelling is generally correct, even on more difficult words (few, if any, errors)
- writer defines and stays on topic but does not fully develop it
- supporting details are relevant but may be limited, overly general, or less important; main idea may not be clearly delineated from the details
- writer attempts to develop the topic in a logical, organized, sequential way but may falter
- ideas and/or details are connected with the topic implicitly rather than explicitly
- words are mostly accurate, specific, and appropriate for the purpose and audience
- sentence structures are simple but accurate
- there may be an attempt to vary sentence structures
- transitions between some sentences may be missing or unclear
- grammar and usage are mostly correct and errors do not impede meaning
- punctuation and capitalization are mostly correct and errors do not impede meaning
- spelling errors are limited to more difficult words and do not impede meaning

2 POINTS

- topic may be defined but not developed, or writing may be a collection of ideas from which no central topic emerges, or topic may be defined, but writer digresses from it
- supporting details are minimal or many are irrelevant
- main idea is not clearly delineated from the details
- writer does not attempt to develop the topic in a logical, organized, sequential way; writing may be a list rather than a developed paragraph
- ideas and/or details are not connected with the topic, even implicitly
- some words are not accurate, specific, or appropriate for the purpose and audience
- sentences may be choppy or repetitive; there may be some sentence fragments
- there is no attempt to vary sentence structures
- transitions between sentences are missing or unclear
- errors in grammar and usage may impede meaning in some instances
- errors in punctuation and capitalization may impede meaning in some instances
- spelling errors in common words may be present and may impede meaning in some instances

1 POINT

- topic, idea, or story line is not defined
- supporting details are absent or irrelevant
- there is no evidence of organization; writing may be a brief list
- many words are not accurate, specific, or appropriate for the purpose and audience
- sentences are simple, repetitive; there may be many fragments
- errors in grammar and usage may severely impede meaning
- errors in punctuation and capitalization may severely impede meaning
- spelling errors are numerous and may severely impede meaning

TEST ITEM MAP—Writing, Grade 8

Number of Test Questions by Performance Standard

PERFORMANCE STANDARDS	NUMBER OF TEST QUESTIONS			PERCENT OF EMPHASIS	TOTAL RAW SCORE POINTS
	MULTIPLE-CHOICE	SHORT RESPONSE	EXTENDED RESPONSE		
Writing Totals	30	5	1	100%	58
W3.1 Write compositions	0	4	1	38%	22
W3.2 Write to achieve purposes					
W3.3 Use correct grammar, sentence construction, paragraph structure, punctuation, spelling, and usage	15	1		28%	16
W3.4 Revise writing to improve organization, word choice, and paragraph development	15			26%	15

MATHEMATICS ASSESSMENT

THE PRACTICE TESTS

The Benchmark **PRACTICE TESTS** were developed to give students and teachers a practical way to become familiar with the kinds of test items that will appear on the Alaska Benchmark Examinations. The practice tests are in no way a predictor of the test taker's grade on the actual Benchmark tests, nor are the practice test questions the same questions that will be on the actual Benchmark tests. The type size of the actual practice tests has been reduced for purposes of this Teacher's Guide.

The **SCORING GUIDES** for the Benchmark Practice Tests provide both correct answers and the guidelines used to score "constructive-response" questions on the practice tests.

The **TEST ITEM MAPS** show the number of questions of each type that measure particular performance standards on each practice test.

PRACTICE TEST—Mathematics, Grade 8

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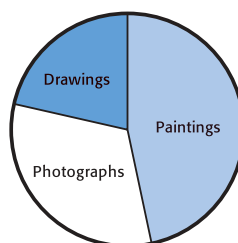
SAMPLE QUESTIONS

Sample A

The circle graph shows the proportions of different types of art in the city museum. About how many paintings are there in the museum?

- (A) 15
- (B) 30
- (C) 45
- (D) 60

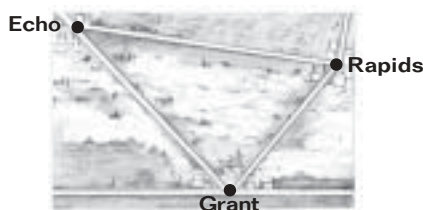
Works of Art in Museum
Total = 100 works of art



Sample B



Use your ruler to help you solve this problem.



KEY

Scale:
1 centimeter = 1 kilometer

Janice rode her bicycle from Echo to Rapids, and then from Rapids to Grant. About how far did she ride in all?

- (A) 13 kilometers
- (B) 7 kilometers
- (C) 20 kilometers
- (D) 8 kilometers

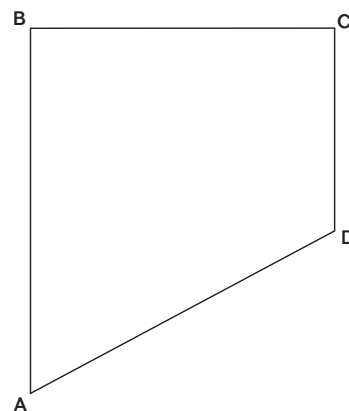
NOTE: The dimensions of the art your printer produces may be slightly different from the original art.

NOTE: The dimensions of the art your printer produces may be slightly different from the original art.

Sample C



Use your ruler and protractor to help you solve this problem.



Robert measured the sides and angles of the quadrilateral. Here are his results:

$AB = 9.0 \text{ cm}$	$m\angle A = 62^\circ$
$BC = 7.5 \text{ cm}$	$m\angle B = 90^\circ$
$CD = 6.5 \text{ cm}$	$m\angle C = 90^\circ$
$AD = 8.5 \text{ cm}$	$m\angle D = 138^\circ$

Robert made two incorrect measurements. On the lines below, write Robert a note giving him the correct measurements.

PRACTICE QUESTIONS



You may refer to the Mathematics Reference Sheet located at the end of this test.

1. David's teacher asked him to solve the problem shown below.

$$(-125 \times 175) + (-125 \times 165) + 110$$

David's answer of 190 is incorrect. What is the correct answer?

- (A) 150
- (B) 160
- (C) 200
- (D) 210

2. A hardware store sells boxes of nails. The nails are $\frac{5}{8}$, $\frac{9}{16}$, $\frac{3}{4}$, and $\frac{1}{2}$ inch in length. If the boxes of nails are to be arranged by nail size from least to greatest, which of the following is the correct order?

- (A) $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{8}$, $\frac{9}{16}$
- (B) $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{3}{4}$
- (C) $\frac{3}{4}$, $\frac{5}{8}$, $\frac{9}{16}$, $\frac{1}{2}$
- (D) $\frac{3}{4}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{1}{2}$

3. Which of the following is equivalent to $7(5n + 1)$?

- (A) $36n$
- (B) $42n$
- (C) $35n + 1$
- (D) $35n + 7$

4. The formula for the perimeter (P) of a rectangle is $P = 2l + 2w$, where l represents the length and w represents the width. What is the perimeter of a rectangle that has a length of 7 centimeters and a width of 4 centimeters?

- (A) 11 centimeters
- (B) 18 centimeters
- (C) 22 centimeters
- (D) 28 centimeters

5. Tickets for a talent show were on sale for six days. The chart below shows the number of tickets sold each day for the first five days.

Talent Show Ticket Sales

Day	1	2	3	4	5
Number of tickets sold each day	6	11	16	21	26

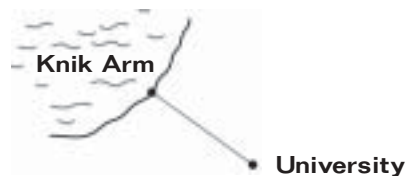
If the pattern of the ticket sales continued, how many tickets were sold on the sixth day?

Answer: _____ tickets

On the line below, write a rule that can be used to determine how many tickets were sold on *any* day.

6.  Use your ruler to help you solve this problem.

For a social studies project, Ryan made a scale drawing of Anchorage. He used a scale of 1 centimeter = 2 kilometers. The segment below represents the distance between Knik Arm and the University on his scale drawing.

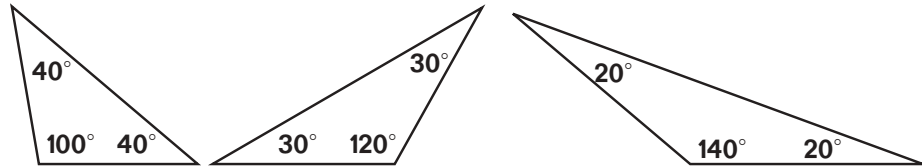


According to Ryan's scale, what is the approximate distance, in kilometers, between Knik Arm and the University?

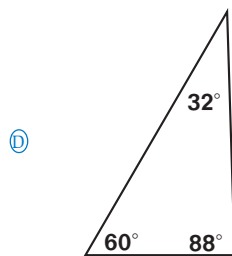
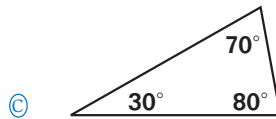
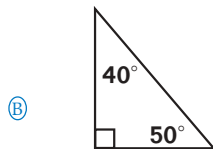
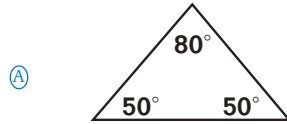
- (A) 2 kilometers
- (B) 4 kilometers
- (C) 6 kilometers
- (D) 8 kilometers

NOTE: The dimensions of the art your printer produces may be slightly different from the original art.

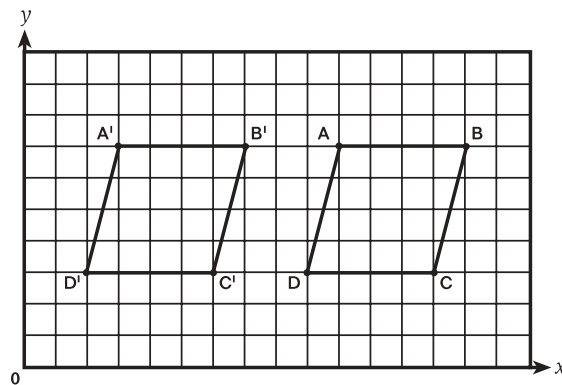
7. Carl drew the triangles shown below.



Carl concludes that all isosceles triangles are obtuse. Which of the triangles below proves Carl to be incorrect?



8. Parallelogram ABCD was translated to parallelogram A'B'C'D'.



How many units and in which direction were the x -coordinates of parallelogram ABCD moved?

- (A) 3 units to the right
- (B) 3 units to the left
- (C) 7 units to the right
- (D) 7 units to the left

9. Tracy is going to paint the outside of a box to give as a gift. The box is 3 inches long, 4 inches wide, and 5 inches high. What is the surface area, in square inches, of the box? Show your work and write your answer in the box below.

Answer: _____ square inches

Tracy is going to fill the box with candy. She needs to know how much candy the box will hold. What is the volume, in cubic inches, of the box? Show your work and write your answer in the box below.

Answer: _____ cubic inches

10. The total area of Alaska is 591,000 square miles. Which of the following is 591,000 expressed in scientific notation?
- Ⓐ 591×10^4
 - Ⓑ 5.91×10^5
 - Ⓒ 59.1×10^5
 - Ⓓ 5.91×10^6
11. Lynn ran a marathon in 3 hours, 9 minutes, and 18 seconds. Amy ran the same marathon in 2 hours, 59 minutes, and 11 seconds. How much more time did it take Lynn than Amy?
- Ⓐ 9 minutes and 57 seconds
 - Ⓑ 10 minutes and 7 seconds
 - Ⓒ 1 hour, 10 minutes, and 3 seconds
 - Ⓓ 1 hour, 50 minutes, and 3 seconds
12. Ms. Sanchez has $\frac{2}{3}$ of a quart of oil to divide evenly between 3 snow machines. Which expression can she use to determine the fraction of a quart of oil each snow machine will receive?
- Ⓐ $\frac{2}{3} \times \frac{1}{3}$
 - Ⓑ $\frac{2}{3} \div \frac{1}{3}$
 - Ⓒ $\frac{2}{3} \times 3$
 - Ⓓ $\frac{3}{2} \times 3$

13. Jasmine needs \$30 to buy a sweater. She uses the following plan to save money. The first day she sets aside \$1. The second day Jasmine sets aside \$1.50. The third day she sets aside \$2, and on the fourth day she sets aside \$2.50. If Jasmine continues this pattern, on which day will she have enough money to buy the sweater?

Ⓐ day 8
Ⓑ day 9
Ⓒ day 10
Ⓓ day 11

14. The data below shows how many hours the students in Ms. Morrison's health class sleep per night.

7, 9, 8, 8, 10, 7, 9, 6, 8, 7, 8, 9, 7, 8, 9

Use this data to complete the frequency table below.

HOURS OF SLEEP PER NIGHT

Number of Hours	Tally	Frequency
6	I	1
7	IIII	4

What is the mean number of hours that a student in Ms. Morrison's health class sleeps per night? Write your answer in the box below.

Answer: _____ hours

15. Mr. Wilson's class participated in a monthly fundraiser by selling snacks. The stem-and-leaf plot below shows the number of snacks each student sold.

SNACKS SOLD

Stem	Leaf
2	2 5
3	1 3 6 9
4	0 2 4 6 7 8
5	4 5 5 6 7 8 9
6	5 8 9
7	1 4 5

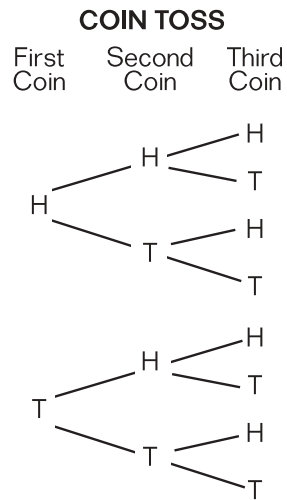
KEY

3 | 6 means 36

How many students sold *more* than 55 packets of snacks?

Ⓐ 10
Ⓑ 12
Ⓒ 13
Ⓓ 15

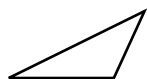
16. Reggie tosses a coin three times in a row. The tree diagram below shows all possible outcomes, where H represents heads and T represents tails.



What is the probability that Reggie will toss two or *more* heads?

- (A) $\frac{1}{8}$
 - (B) $\frac{3}{8}$
 - (C) $\frac{4}{8}$
 - (D) $\frac{7}{8}$
17. A factory uses 220,000 gallons of water to produce 2 tons of steel. How many gallons of water are needed to produce 1 pound of steel?
- (A) 55 gallons
 - (B) 110 gallons
 - (C) 110,000 gallons
 - (D) 440,000 gallons
18. Donnie wants to enlarge a photograph that measures 3 inches by 5 inches. If both dimensions are doubled, what happens to the *area* of the photograph?
- (A) It is doubled.
 - (B) It is multiplied by 4.
 - (C) It remains the same.
 - (D) It is multiplied by 8.

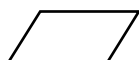
Mathematics Reference Sheet—Grade 8



Triangle



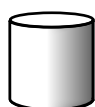
Rectangle



Parallelogram



Circle



Right Circular Cylinder



Rectangular Solid

Area

$$\frac{1}{2}bh$$

$$lw$$

$$bh$$

$$\pi r^2$$

Volume

$$\pi r^2h$$

$$lwh$$

KEY

b = base

w = width

h = height

d = diameter

l = length

r = radius

Use 3.14 or $\frac{22}{7}$ for π .

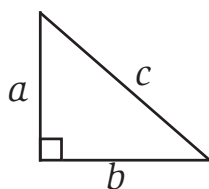
$$\text{Circumference} = \pi d = 2\pi r$$

Total Surface Area

$$2\pi rh + 2\pi r^2$$

$$2(lw) + 2(hw) + 2(lh)$$

Pythagorean
Theorem: $c^2 = a^2 + b^2$



Distance, rate, time formula, where
 d = distance, r = rate, t = time:

$$d = rt$$

Simple Interest = $p rt$

where p = principal, r = rate, t = time.

Conversions

$$1 \text{ yard} = 3 \text{ feet} = 36 \text{ inches}$$

$$1 \text{ mile} = 1,760 \text{ yards} = 5,280 \text{ feet}$$

$$1 \text{ acre} = 43,560 \text{ square feet}$$

$$1 \text{ hour} = 60 \text{ minutes}$$

$$1 \text{ minute} = 60 \text{ seconds}$$

$$1 \text{ liter} = 1000 \text{ milliliters} = 1000 \text{ cubic centimeters}$$

$$1 \text{ meter} = 100 \text{ centimeters} = 1000 \text{ millimeters}$$

$$1 \text{ kilometer} = 1000 \text{ meters}$$

$$1 \text{ gram} = 1000 \text{ milligrams}$$

$$1 \text{ kilogram} = 1000 \text{ grams}$$

$$1 \text{ cup} = 8 \text{ fluid ounces}$$

$$1 \text{ pint} = 2 \text{ cups}$$

$$1 \text{ quart} = 2 \text{ pints}$$

$$1 \text{ gallon} = 4 \text{ quarts}$$

$$1 \text{ pound} = 16 \text{ ounces}$$

$$1 \text{ ton} = 2,000 \text{ pounds}$$

SCORING GUIDE—Mathematics, Grade 8

MULTIPLE-CHOICE QUESTIONS

Sample A C

Sample B A

1. C
2. B
3. D
4. C
6. B
7. A
8. D
10. B
11. B
12. A
13. C
15. A
16. C
17. A
18. B

CONSTRUCTED-RESPONSE QUESTIONS

Sample C

Complete and Correct Response

Explanation equivalent to the following statements:

- The length of line CD should be 5 centimeters.

AND

- The measure of angle D should be 118° .

NOTE: Allow ± 0.5 cm for the length measurement and $\pm 2^\circ$ for the angle measurement.

Score Points: 2 points

- 1 point for each correct statement

Item 5

Complete and Correct Response

- 31 tickets

AND

- $5n + 1$

OR

- The number of tickets sold is equal to 5 times the number of days (n) that tickets have been sold plus 1.

NOTE: Other variables may be used.

OR

- Other valid rule

Score Points: 2 points

- 1 point for correct answer of 31 tickets sold on sixth day
- 1 point for correct rule

Item 9

Complete and Correct Response

- $2 \times 4 \times 3 + 2 \times 5 \times 4 + 2 \times 3 \times 5$
 $24 + 40 + 30$

OR

- Other valid process

AND

- 94 square inches

AND

- $3 \times 4 \times 5$

OR

- Other valid process

AND

- 60 cubic inches

Score Points: 4 points

- 1 point for correct process of finding surface area
- 1 point for correct answer of surface area
- 1 point for correct process of finding volume
- 1 point for correct answer of volume

Item 14

Complete and Correct Response

- **HOURS OF SLEEP PER NIGHT**

Number of Hours	Tally	Frequency
6	I	1
7	IIII	4
8	IIII	5
9	IIII	4
10	I	1

AND

- 8 hours

Score Points: 2 points

- 1 point for correct frequency table
- 1 point for correct answer of mean

TEST ITEM MAP—Mathematics, Grade 8

Number of Test Questions by Performance Standard

PERFORMANCE STANDARDS	NUMBER OF TEST QUESTIONS			PERCENT OF EMPHASIS	TOTAL RAW SCORE POINTS
	MULTIPLE-CHOICE	SHORT RESPONSE	EXTENDED RESPONSE		
A1: Numeration	4	1		13%	6
A1.3.1 Read, write, model, and order real numbers, explaining scientific notation, exponents, and percents.	1				
A1.3.2 Model counting in a different base system.					
A1.3.4 Translate between equivalent representations of the same number. Select a representation that is appropriate for the situation.	1				
A1.3.5 Describe and model the relationship of fractions to decimals, percents, ratios, and proportions.					
A1.3.6 Use, explain, and define the rules of divisibility, prime and composite numbers, multiples, and order of operations.	1	1			
A1.3.7 Use commutative, identity, associative, and distributive properties with variables.	1				

PERFORMANCE STANDARDS	NUMBER OF TEST QUESTIONS			PERCENT OF EMPHASIS	TOTAL RAW SCORE POINTS
	MULTIPLE-CHOICE	SHORT RESPONSE	EXTENDED RESPONSE		
A2: Measurement	5	1		15%	7
A2.3.1 Estimate and measure various dimensions to a specified degree of accuracy.	1				
A2.3.2 Estimate and convert measurements within the same system.	2				
A2.3.3 Use a variety of methods and tools to construct and compare plane figures of given measures.					
A2.3.4 Describe and apply the relationships between dimensions of geometric figures to solve problems using indirect measurement; describe and apply the concepts of rate and scale.	1	1			
A2.3.5 Apply information about time zones and elapsed time to solve problems.	1				

PERFORMANCE STANDARDS	NUMBER OF TEST QUESTIONS MULTIPLE-CHOICE	SHORT RESPONSE	EXTENDED RESPONSE	PERCENT OF EMPHASIS	TOTAL RAW SCORE POINTS
A3: Estimation and Computation	5	1		16%	7
A3.3.1 Apply, explain, and assess the appropriateness of a variety of estimation strategies including truncating and rounding to compatible numbers.	2				
A3.3.2 Apply basic operations efficiently and accurately, using estimation to check the reasonableness of results. (This will be encompassed in A3.3.3)					
A3.3.3 Add and subtract fractions, decimals, and percents.	2				
A3.3.4 Multiply and divide rational numbers in various forms including fractions, decimals, and percents.	1	1			
A3.3.5 Convert between equivalent fractions, decimals, percents, and proportions. Convert from exact to decimal representations of irrational numbers.					
A3.3.6 Solve problems using ratios and proportions.					

PERFORMANCE STANDARDS	NUMBER OF TEST QUESTIONS MULTIPLE-CHOICE	SHORT RESPONSE	EXTENDED RESPONSE	PERCENT OF EMPHASIS	TOTAL RAW SCORE POINTS
A4: Functions and Relationships	7	1		20%	9
A4.3.1 Identify numeric and geometric patterns to find the next term and predict the <i>n</i> th term.	2	1			
A4.3.2 Identify and describe how a change in one variable in a function affects the remaining variables (e.g., how changing the length affects the area and volume of a rectangular prism).	1				
A4.3.3 Use a calculator to find a missing item in an arithmetic and a geometric sequence; predict the graph of each function.					
A4.3.4 Translate among and use tables of ordered pairs, graphs on coordinate planes, and linear equations as tools to represent and analyze patterns.					
A4.3.5 Find the value of a variable by evaluating formulas and algebraic expressions for given values.	4				

PERFORMANCE STANDARDS	NUMBER OF TEST QUESTIONS			PERCENT OF EMPHASIS	TOTAL RAW SCORE POINTS
	MULTIPLE-CHOICE	SHORT RESPONSE	EXTENDED RESPONSE		
A5: Geometry	5		1	20%	9
A5.3.1 Identify, classify, compare, and sketch regular and irregular polygons.					
A5.3.2 Model, identify, draw and describe 3-dimensional figures including tetrahedrons, dodecahedrons, triangular prisms, and rectangular prisms.					
A5.3.3 Apply the properties of equality and proportionality to solve problems involving congruent or similar shapes.			1		
A5.3.4 Estimate and determine volume and surface areas of solid figures using manipulatives and formulas; estimate and find circumferences and areas of circles.	1				
A5.3.5 Draw and describe the results of transformations including translations (slides), rotations (turns), reflections (flips), and dilations (shrinking or enlarging).	3				
A5.3.6 Use coordinate geometry to represent and interpret relationships defined by equations and formulas including distance and midpoint.	1				
A5.3.7 Draw, measure, and construct geometric figures including perpendicular bisectors, polygons with given dimensions and angles, circles with given dimensions, perpendicular and parallel lines.					

PERFORMANCE STANDARDS	NUMBER OF TEST QUESTIONS			PERCENT OF EMPHASIS	
	MULTIPLE-CHOICE	SHORT RESPONSE	EXTENDED RESPONSE		
A6: Statistics and Probability	3	2		16%	7
A6.3.1 Collect, analyze and display data in a variety of visual displays including frequency distributions, circle graphs, box and whisker plots, stem and leaf plots, histograms, and scatter plots with and without technology.	1				
A6.3.2 Interpret and analyze information found in newspapers, magazines, and graphical displays.	1	1			
A6.3.3 Determine and justify a choice of mean, median, or mode as the best representation of data for a practical situation.					
A6.3.4 Make projections based on available data and evaluate whether or not inferences can be made given the parameters of the data.	1				
A6.3.5 Use tree diagrams and sample spaces to make predictions about independent events.		1			
A6.3.6 Design and conduct a simulation to study a problem and communicate the results.					



APPENDIX 3

PROFICIENCY DESCRIPTORS

WHAT PROFICIENCY DESCRIPTORS CAN TELL TEACHERS, STUDENTS, AND PARENTS

Students can demonstrate four levels of proficiency on each subject area test of the Grade 8 Alaska Benchmark Examination. Students' scores are interpreted to indicate that their performance is **advanced**, **proficient**, **below proficient**, or **not proficient** in each subject area—reading, writing, and mathematics. To give more specific information about what these ratings mean, the committees that established the “cut scores” to distinguish among the ratings developed a series of **PROFICIENCY DESCRIPTORS**. The descriptors can help parents, teachers, and students to understand how far students have progressed in mastering the content and skills that are assessed on the Benchmark Examinations.

A score at a given performance level indicates that a student's work on a particular test demonstrates the majority of skills and content characterized by that level and even more of what is described for the levels below. Some students may achieve some of the competencies described in the next level as well, but not well enough to have scored at that next level.

The short forms of the proficiency descriptors are printed out for students and parents on the score cards they receive after the examination. These give general information about what the student knows and can do. Longer versions of the descriptors describe proficiencies in greater detail, giving teachers and administrators specific information for establishing instructional priorities and helping students meet the performance standards for their age group.

Both short and long forms of the proficiency descriptors are included in this appendix. In some cases, because of the nature of certain competencies, the long forms describe proficiency at only one or two of the three proficiency levels.

PROFICIENCY DESCRIPTORS READING, GRADE 8—Short Form

BELOW PROFICIENT

The student uses context clues to define words; summarizes specific points about text; determines main idea or purpose; locates information that supports statement; follows directions and completes a simple form; and identifies a character's motivation and point of view.

PROFICIENT

The student uses context clues and word origins to determine meaning of words and jargon; identifies theme of text; provides general explanation and draws conclusion about character's point of view; interprets statement in text; compares information in text; infers and restates main idea; identifies technique used to promote point of view in text; retells a story; and compares characters.

ADVANCED

The student uses context clues to determine meaning of new words and comprehend text; identifies interpretation of a theme; analyzes statements; restates information in complex text; identifies summary of main idea; compares information from different sources; identifies and compares statements to identify and support main idea; understands terminology needed to complete a form; identifies different types of text; draws conclusions from challenging texts; analyzes author's technique and purpose; and identifies implied opinion.

PROFICIENCY DESCRIPTORS

READING, GRADE 8—Long Form

Reads unfamiliar words

The below proficient student

- Uses context clues to define words.

The proficient student

- Applies knowledge of word origin and/or context clues to determine the meaning of a word.
- Uses context clues to determine the meaning of jargon.

The advanced student

- Uses context clues to determine the meaning of a new word and to comprehend text.

Supports understanding of theme

The proficient student

- Selects the correct description of the theme of an essay.
- Gives a general explanation of the point of view of a character, citing one main point.
- Makes inferences to interpret a statement in an article or story.
- Draws conclusions about a character's point of view in a poem.

The advanced student

- Interprets complex sentences to determine the correct interpretation of a theme.

Restates or summarizes information

The below proficient student

- Summarizes or restates specific points of an article or a poem.
- Determines what an interview or a story is about.

The proficient student

- Restates a main point from a poem.
- Makes a comparison based on information in an article.

The advanced student

- Analyzes a group of statements.
- Restates information from a complex text.
- Identifies a correct summary of the main idea of an article.

Assesses support for main idea

The below proficient student

- Locates and selects evidence that supports a statement.

The proficient student

- Infers the main idea from events in a story.
- Identifies a correct restatement of the main idea of a story.

The advanced student

- Assesses and compares information from different sources.
- Identifies multiple examples of support for a main point in an article.
- Analyzes, assesses, and compares statements to identify the main idea.
- Establishes support for a complex statement.

Follows multi-step directions

The below proficient student

- Follows simple directions to determine what information is asked for on a simple form.
- Identifies where information belongs on a simple form.

The advanced student

- Understands terminology needed to complete an application form.

Identifies rules of forms of texts

The proficient student

- Identifies the technique used to promote a point of view in an article.

The advanced student

- Identifies the type of text.

Analyzes basic story elements

The below proficient student

- Determines a character's point of view in a text.
- Finds evidence to support a character's stated point of view.
- Identifies the motivation of a character in a text.

The proficient student

- Retells a story from a different point of view using more than one supporting detail.
- Draws a conclusion about a person based on a statement made in an interview.
- Compares characters in a play.

The advanced student

- Retells a story from a different point of view using three or more supporting details.
- Draws conclusions from more challenging texts and whole passages.

Analyzes author's purpose

The below proficient student

- Makes a simple inference from an article.

The advanced student

- Identifies an implied opinion.
- Identifies the cause of a change in tone.
- Interprets a complex phrase.
- Interprets complex sentences to support theme.
- Analyzes an author's technique to determine the author's purpose.

PROFICIENCY DESCRIPTORS WRITING, GRADE 8—Short Form

BELOW PROFICIENT

The student writes a loosely defined story, topic, or idea in simple sentences or fragments; uses basic punctuation, spelling, and grammar; and uses simple sentence structures.

PROFICIENT

The student writes with a clear thesis statement or main idea; includes relevant details, attempts logical and sequential organization; chooses appropriate form of writing when responding to a prompt; identifies and corrects errors in punctuation, spelling, and grammar; identifies and combines sentences and clauses; corrects sentence structure errors; organizes paragraph by placing sentences in order and eliminating redundancy; and identifies relevant sentences to add to a paragraph.

ADVANCED

The student writes a composition with a clear main idea and well-developed supporting details; uses transitions to connect ideas; organizes smooth flow of ideas; uses appropriate form of writing when responding to a prompt; displays awareness of audience; consistently corrects errors in punctuation, spelling, grammar, and syntax; and organizes a paragraph by eliminating irrelevant information, selecting appropriate supporting details, and choosing words to show the relationship of ideas.

PROFICIENCY DESCRIPTORS WRITING, GRADE 8—Long Form

Writes compositions

The below proficient student

- Writes a topic, idea, or story line that is loosely defined.
- Writes with simple sentences and sentence fragments.

The proficient student

- Writes a composition with a clear main idea.
- Uses relevant supporting details.
- Attempts a logical, sequential organization (beginning, middle, end).
- Chooses the appropriate form of writing (persuasion, information, description) to respond to the prompt.

The advanced student

- Writes a composition with a clear main idea and well-developed support.
- Uses thoughtful transitions to connect ideas.
- Organizes the ideas to flow smoothly with an inviting introduction, satisfying conclusion, and appropriate use of occasional moments that surprise, amuse, or move the reader.
- Displays a keen awareness of audience.

Proofreads writing

The below proficient student

- Uses basic punctuation, spelling, and grammar.
- Uses simple sentence structures.

The proficient student

- Identifies and corrects errors in
 - punctuation (comma placement, end marks).
 - spelling (contractions, homophones).

Revises writing for organization

- grammar (possession, verb tense, run-on sentences, subject/verb agreement, transition words).
- Identifies and combines complex sentences, simple sentences, and clauses.
- Corrects sentence structure errors, including misplaced modifiers and lack of internal consistency.

The advanced student

- Consistently corrects errors in punctuation, spelling, and grammar.
- Corrects a wide variety of sentence structure and grammar errors.

The proficient student

- Organizes a paragraph by
 - placing sentences in logical order.
 - combining short, simple sentences into a single sentence to eliminate redundancy and make writing smoother.
 - identifying the most relevant sentence to add to a paragraph.

The advanced student

- Organizes a paragraph by
 - eliminating sentences that are off-topic.
 - selecting appropriate details to support a topic sentence.
 - combining contrasting sentences using conjunctions that show the relationship of the ideas.

PROFICIENCY DESCRIPTORS

MATHEMATICS, GRADE 8—Short Form

BELOW PROFICIENT

The student can read, write, and order positive and negative numbers; measure using a ruler, and convert measurements within a system; add, subtract, multiply and divide whole numbers, and write ratios and proportions; continue numeric and geometric patterns and use a line graph to predict an answer; construct and compare geometric figures, draw an object to specifications, make and use scale drawings, and recognize the results of transformations and enlargements; and interpret, analyze, and convert information found in tables and graphs.

PROFICIENT

The student can recognize prime numbers and operations with variables and convert between numeric forms; use estimation, ratios, proportions, and graphs to solve simple word problems, add, subtract, multiply, divide fractions, decimals and percents; solve equations, describe a mathematical relationship, and explain how changing one variable affects other variables; recognize types of angles, recognize and draw similar and congruent figures, use proportionality, and plot points using ordered pairs; and use appropriate scales for graphs.

ADVANCED

The student can explain and defend answers, solve problems involving time zones, and use the Pythagorean Theorem; solve multi-step real-world problems; identify any missing term in a sequence; explain similarity and proportionality, use a scale factor to find new dimensions, identify errors in mathematical strategies, and use and explain geometric formulas for plane and solid figures; construct a scatter plot or graph from given data, explain and justify statistical conclusions, and determine the probability of an event occurring.

PROFICIENCY DESCRIPTORS MATHEMATICS, GRADE 8—Long Form

Numeration

The below proficient student

- Orders positive and negative numbers.
- Reads and writes large numbers in many forms, including exponents and expanded form.

The proficient student

- Recognizes the properties of addition, subtraction, and multiplication with numbers and variables.
- Converts between fractions, decimals, and percents.
- Recognizes prime numbers.

The advanced student

- Explains what a prime number is.

Measurement

The below proficient student

- Uses a ruler to measure lengths.
- Converts measurements within a given measuring system.

The proficient student

- Solves problems involving elapsed time.
- Accurately reads a measurement tool.

The advanced student

- Explains and defends solutions using appropriate vocabulary.
- Solves problems involving time zones.
- Uses the Pythagorean Theorem ($a^2 + b^2 = c^2$).
- Determines the circumference of a circle.

Estimation and Computation

The below proficient student

- Accurately adds, subtracts, multiplies and divides whole numbers.
- Uses mathematical symbols to represent information in problems.
- Writes a ratio or proportion.

The proficient student

- Uses estimation to solve problems.
- Adds, subtracts, multiplies, and divides fractions, decimals, and percents.
- Solves one-step real-world word problems.
- Uses ratios and proportions to solve problems.
- Uses appropriate symbols to explain and justify an answer.

The advanced student

- Solves multi-step real-world word problems involving such topics as discount and sales tax.

Functions and Relationships

The below proficient student

- Identifies numeric and geometric patterns to predict the next item in a pattern.
- Uses the information in a line graph to predict an answer.

Geometry

The proficient student

- Solves multi-step algebraic expressions and equations containing one variable.
- Identifies and describes how a change in one variable affects other variables.
- Adds, subtracts, and multiplies algebraic expressions.
- Finds a missing number within a sequence.
- Uses known facts to analyze a problem and determine unknown information.

The advanced student

- Identifies any term of a sequence.

The below proficient student

- Constructs and compares geometric figures.
- Draws and measures an object.
- Makes and uses scale drawings.
- Recognizes the results of transformations and enlargements.

The proficient student

- Recognizes right, acute, and obtuse angles.
- Recognizes, compares, and draws similar and congruent figures.
- Shows the use of proportionality.
- Uses ordered pairs to plot points on a grid.

The advanced student

- Explains similarity and proportionality.
- Uses a scale factor to find new dimensions.
- Identifies errors in mathematical strategies.
- Uses and explains geometric formulas for plane and solid figures.

Statistics and Probability

The below proficient student

- Interprets and analyzes information found in tables, charts, and graphs and converts or displays the information in other forms.

The proficient student

- Selects and uses appropriate scales for graphs.
- Selects appropriate data from a table or graph and uses it to solve a problem.

The advanced student

- Constructs a graph from given data.
- Explains and justifies statistical conclusions.
- Determines the probability of an event.



APPENDIX 4

An Overview of Standards and the Comprehensive System of Student Assessment in Alaska

OVERVIEW

AN OVERVIEW OF ALASKA'S STANDARDS AND THE ALASKA BENCHMARK EXAMINATIONS

Beginning in 1993 and 1994 the Alaska State Board of Education & Early Development adopted content standards for students in 10 areas—English/language arts, mathematics, science, geography, government and citizenship, history, skills for a healthy life, arts, world languages, and technology. Later, the Board adopted employability standards and endorsed the cultural standards for students developed by the Alaska Native Knowledge Network in 1998. All of these standards are broad statements of what students should know and be able to do as a result of their twelve years of public schooling.

In addition to the broad statements of what students should know and be able to do that are laid out in the **content standards**, more specific statements of what students should know and be able to do were expressed in student **performance standards** for three subject areas—reading, writing, and mathematics. The reading and writing performance standards are more specific statements of the content standards in English/language arts. The mathematics performance standards are more specific statements of the content standards in mathematics.

Performance standards were written for four age groups of students and are commonly referred to as **benchmarks**. The first benchmark is for students ages 5-7; the second for students ages 8-10; the third for students ages 11-14; and the fourth for students ages 15-18. The fourth benchmark is also referred to as the high school benchmark.

The Alaska Comprehensive System of Student Assessments calls for **Benchmark Assessments** to be administered to all students across the state in grades 3, 6, and 8 in reading, writing, and mathematics. In addition, the High School Graduation Qualifying Exam can be administered to high school students beginning in their second semester of the 10th grade. The correspondence between benchmark age groups and the grade levels offered in traditional schools is as follows:

Benchmark	Age Group	Grades when students are instructed on standards	Grade level of benchmark exam
1	5-7 yrs	Grades K-2	Grade 3
2	8-10 yrs	Grades 3-5	Grade 6
3	11-14 yrs	Grades 6-8	Grade 8
High School	15-18 yrs	Grades 9-12	Grades 10-12

The information in this table provides a guideline for schools and not a requirement. Students progress at different rates over their public school careers, and local school districts have clear authority to establish their own curricula and instructional programs within the constraints of state statutes and regulations. An instructional and curricular sequence based on these guidelines, however, would clearly offer students an excellent opportunity to learn the standards and do well on the benchmark examinations and the High School Graduation Qualifying Exam.

The four Benchmark Assessments are part of the **Alaska Comprehensive System of Student Assessments**, a program designed to provide ongoing information about performance on the reading, writing, and mathematics performance standards throughout a student's K-12 educational experience. The system provides for continual monitoring of student progress and will help alert schools when students need additional assistance in mastering the standards well before they take the High School Graduation Qualifying Exam.

The components of the Comprehensive System of Student Assessments are displayed in the following table:

Components of the Comprehensive System of Student Assessments	Grade at which Administered
Developmental Profile	Kindergarten & entering grade 1
Benchmark 1 Assessment	Grade 3
Norm-referenced Test	Grade 4
Norm-referenced Test	Grade 5
Benchmark 2 Assessment	Grade 6
Norm-referenced Test	Grade 7
Benchmark 3 Assessment	Grade 8
Norm-referenced Test	Grade 9
High School Graduation Qualifying Examination	First offered in spring of grade 10. Students can continue taking until they pass all three parts. Offered again twice a year in grades 11 and 12, and twice a year for up to 3 years after completion of high school.

The **Developmental Profile** is administered to kindergarten students or first grade students entering the public schools for the first time. It asks the teachers of these students to record students' developmental readiness using 11 indicators and to record background characteristics in three areas. *For more information see the Alaska Kindergarten/First Grade Profile section on the Alaska Department of Education & Early Development web site: (www.eed.state.ak.us).*

As discussed above, the **Benchmark Assessments** given to students in grades 3, 6, and 8 measure student performance in relation to statewide standards for reading, writing, and mathematics. These standards are developmentally related to the standards for high school students, and they monitor students' progress over their 12-year public school experience.

Beginning in March 2002, students in grades 4, 5, 7, and 9 will be given a **Norm-referenced Test**, Terra Nova, *The Second Edition*®. Norm-referenced tests are valuable because they provide information about how well students in Alaska compare with students nationally. The Benchmark Assessments and the High School Graduation Qualifying Exam cannot be used to compare Alaska students with students in other states or the nation because they are unique tests that measure how well students have achieved the Alaska Performance Standards in Reading, Writing, and Mathematics.

On the basis of student data from all these tests, the Department of Education & Early Development will begin in August 2002 to issue **School Designators** for each of the 500 schools in the state. Schools will be designated as distinguished, successful, deficient, or in crisis.

For more information see Frequently Asked Questions, Proficiency Descriptors, and Alaska Content and Performance Standards in Reading, Writing and Mathematics in this teacher's guide; or visit the Department of Education & Early Development web site: (www.eed.state.ak.us).

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